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# JOURNAL

OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

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ASSISTED BY A PUBLISHING COMMITTEE, CONSISTING OF

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## PREFACE.

THE termination of another volume of the Journal of Pharmacy, naturally leads us to express our thanks to those by whose exertions it has been maintained. The fate of periodical publications in the United States, with very few exceptions, has been unfortunate, however important may have been their subject matter, or however ably they may have been conducted. The best known, and most certainly not the least valuable of those devoted to science and the arts, has only preserved its existence through the strenuous and indefatigable exertions of its editor. The present publication has not been exempt from those difficulties, and its continuance must depend on the pecuniary support it receives. This, hitherto, has been merely sufficient to enable us to publish it at the regular periods, without, as has been ardently hoped, increasing the number of its pages and illustrations.

We would therefore most earnestly impress on our subscribers, the absolute necessity that exists for punctuality in their payments. To many of them, this may be unnecessary, but others appear to have forgotten that the subscriptions are

payable in advance. It is painful to us to touch on this disagreeable subject, but we have felt it as a duty demanded alike by the interests of the publication and our engagements with others.

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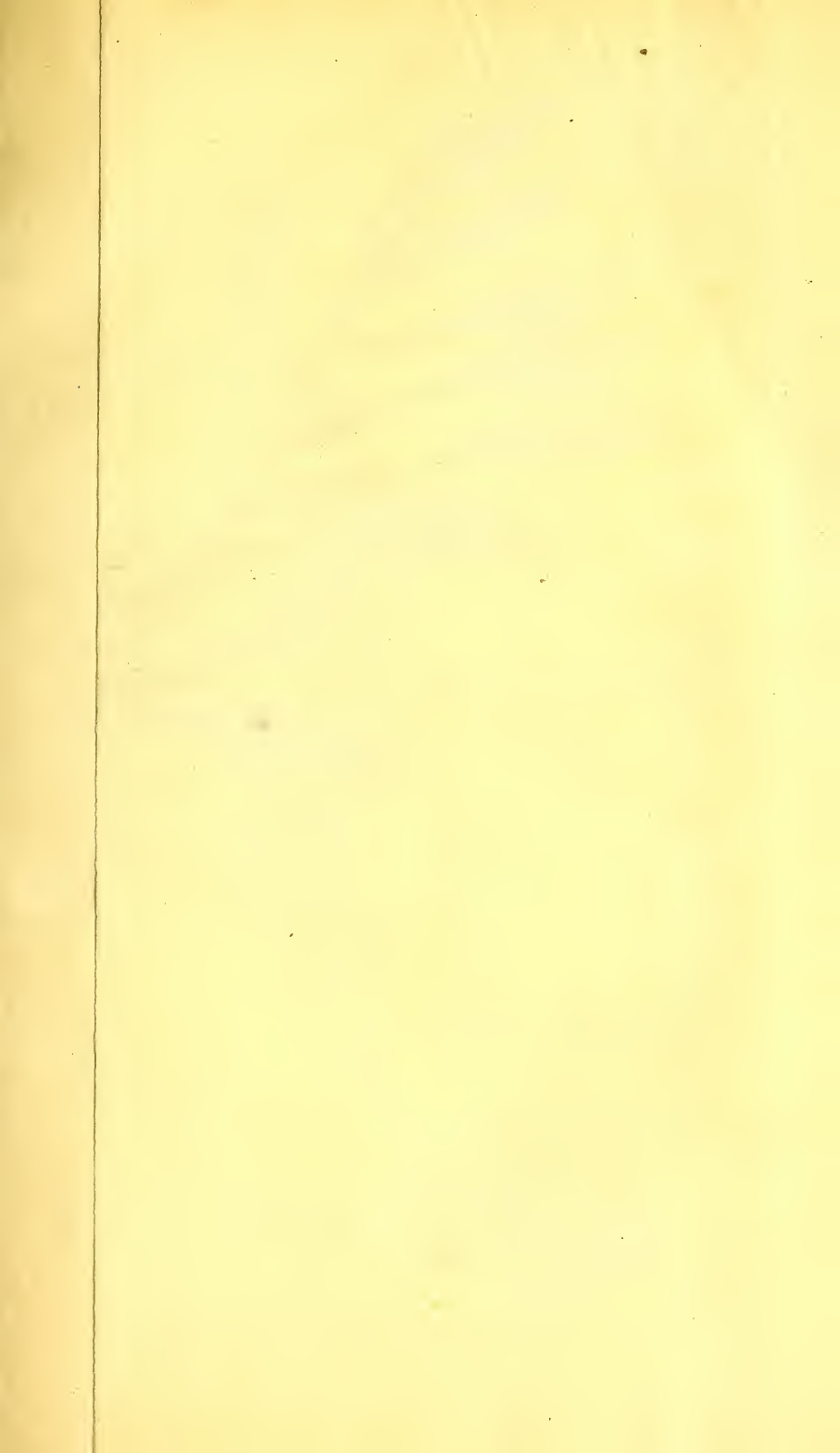
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Drawn from Nature by W. F. C. Fernald

2200 - Vol. 10, No. 1

*SPIGELIA MARILANDICA.*

( Carolina Pink root )







Drawn from Nature by W. F. C. Barton

Drugg. Williams, Knapp & Co.

**SPIGELIA MARILANDICA.**

( Carolina Pink-root. )

# JOURNAL

OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

APRIL 1832.

## Original Communications.

ARTICLE I.—*On Spigelia Marilandica.* By R. Eglesfeld Griffith, M.D.

Nat. Ord. GENTIANEÆ.

Sex. Syst. PENTANDRIA, MONOGYNIA.

**SPIGELIA.** Calyx 5-parted. Corolla funnel formed, border 5-cleft, equal. Anthers convergent. Capsule, didymous, 2-celled, 4-valved, many seeded.—Nuttall.

*S. Marilandica.* Root, fibrous, perennial. Stem, herbaceous, 6-20 inches high, branching near the base, slightly winged, towards the summit pubescent. Leaves, sessile, ovate lanceolate, acute, with the margin and veins underneath pubescent. Flowers, in a simple, terminal, secund raceme. Calyx, 5-leaved, persistent, leaves subulate acute, finely serrulate. Corolla, 1-petal, tube angled, ventricose, five times as long as the calyx, yellow within, crimson without, border 5-cleft, segments acute, somewhat expanded. Filaments, shorter than the corolla, inserted into the tube between the segments. Anthers, oblong, cordate, 2-celled, yellow. Germ, superior, ovate. Style, longer than the corolla, jointed at its base. Stigma, simple, obtuse.—Elliot.

*Capsule.* Subrotund, didymous, 2-celled, 4-valved. Seeds, numerous, angular, scabrous.—Willdenow.

*Synon.* *Lonicera Marilandica spicis terminalibus.* L. Sp. pl. 3. p. 249. Gron. Virg. 142.

VOL. IV.—A

*Synon.* *Periclymeni Virginiani flore coccineo.* Sherard, Raii sup. 32, Catesb. Carol. 11, t. 78.

*Anthelmia.* Lining. Essays Phys. and Lit. v. 1 and 3.

*Spigelia oppositifolia.* Stokes. Bot. Mat. Med. I. 309.

*S. Americana.* Monro. III. 270.

*S. Lonicera.* Miller, Gard. Dict.

*S. Marilandica.* L. Syst. Veg. 197. Nuttall, Gen. II. 134. Elliot, I. 236, &c. &c. &c.

*Icon.* Curt. Bot. Mag. 3, t. 80. Woodville, Med. Bot. 2, t. 105. Bigelow, Med. Bot. I. 46. Barton, Med. Bot. 2, t. 31, &c.

*Common Names.* Carolina Pink. Indian Pink. Pink root. Worm grass. Starbloom.

*Pharm.* *Spigelia*, U. S. Pharm. *Radix Spigelia Marilandica.* E. *Spigelia Radix*, L. D.

*Offic. Root.* Consisting of a great number of slender, blackish fibres, forming a dense bunch. Generally imported from the southern states, in bundles of about a foot in length, consisting of the whole plant. Taste of root nauseous.

*Description.* Few of the medicinal plants are possessed of greater beauty, than the species now under consideration: it is an herbaceous perennial, of from six to twenty inches in height, with a root consisting of a great number of slender fibres, forming a dense tuft; they are of a yellow colour when first removed from the earth, but become brownish-black on exposure to the air. From the root proceed many quadrangular, smooth, annual stems of a purplish colour, furnished with sessile, opposite, ovate, entire leaves, glabrous except on the margins and inferior nervures, where they are pubescent. The flowers, which are few in number, are borne on a terminal raceme, which is secund or leaning to one side, and are furnished with short peduncles. The corolla is funnel shaped, contracted towards the top, and divided into five acute segments. It is of a rich carmine colour externally, with the exception of near the base where it is whitish; the interior is of an orange yellow. The margins of the segments of the corolla are slightly tinged with green. Not more than one or two of the flowers are expanded at the same time. The calyx which is persistent, consists of five long, finely serrate leaves, which are reflected when the fruit is mature. The stamina are shorter than the corolla, and though inserted near the upper part of the tube, are decurrent and may be traced to its

base. The anthers are oblong and narrow. The style is about the length of the corolla, jointed below, and terminated by a fusiform, acute, pubescent stigma. The germ is superior and ovate. The capsule is double, with two globular lobes and cells, and contains many angular rough seeds.

There are several varieties, both as respects the form of the leaves and the colour of the flowers.

*Habitat.* The *Spigelia* is a native of the southern, and south-western states, where it is very abundant in particular spots. It was formerly found as far north as Baltimore, but has been extirpated by the industry of collectors; it has even become rare in Virginia. It has never been found wild to the north of Pennsylvania, of which Muhlenberg mentions it as a native; it, however, thrives luxuriantly in gardens, especially at Colonel Carr's (Bartram's) botanic garden, Kingessing. Whilst on this subject it may be proper to notice an error, or rather a tissue of errors, committed by a writer of a "natural history tour in North America," in Loudon's Magazine of Natural History, &c. for March 1831. This author states, "the pink root, (*Spigelia Marilandica*) was common, and in full bloom [among the rocks of the Palisades on the Hudson, above New York]. This plant has long been known in medicine as a vermifuge, and at one time acquired great celebrity; but, like every thing else, was overrated. It has lately fallen into disrepute, and is now but seldom used. It is, however, an elegant plant; grows most luxuriantly in the shade from the chinks and shelves of moss-covered rocks, where there is scarcely the appearance of earth; and from its spreading, bright red flowers, forms a relief, and an agreeable contrast to the gloom which mostly surrounds it." This information may be as new to our botanists, as his discovery of the Gigantic Sun-fish (*Tetrodon mola*) in the small lake forming the principal source of the Hackinsack river, near Vredideka Hook, will be to our ichthyologists.

The *Spigelia* grows in rich dry soils, on the borders of woods, and flowers from May to July, ripening its seeds late in the autumn.



*Bot. History.* This plant was known to botanists at a very early period, and was considered by them, and even by Linnaeus at one time, as a species of Honeysuckle, but he afterwards very properly erected it into a new genus, which he dedicated to Adrian Spigelius, a learned botanist and anatomist, who was born at Brussels in 1578, and died at Padua in 1625, where he was professor of anatomy and surgery; his principal botanical work was "*Isagoges in rem herbariam*," published in Leyden in 1633.

There are several other species of this genus, natives of America, viz. *S. anthelmia*, *S. hamelliodes*, *S. peduncularis* and *speciosa*.

*Med. History.* The Carolina pink-root appears to have been known to the aborigines as a vermifuge of considerable power, and was in domestic use among the early settlers in the southern states a long time before it attracted the notice of the medical public. About the same time, however, it was brought into notice by Drs Garden, Lining and Chalmers of Carolina, and from the information they promulgated with respect to it, it became generally employed, and has since maintained a high rank as an anthelmintic.

*Medical Properties.* The pink-root is principally prescribed for the expulsion of the round worm or lumbricus, and is perhaps more generally used than any other of our native articles of the anthelmintic class. The whole plant is possessed of active properties, but the root is usually employed as being the most powerful; and this is most striking when in a recent state, as there is no article which deteriorates by long exposure to the air, in a more remarkable degree than the pink-root, and to this may, in all probability, be attributed the contradictory accounts that have been given of its qualities. In conjunction with its anthelmintic powers, it sometimes acts as a purge, and some writers have attributed all its virtues to the production of this action; this however is evidently erroneous, as it manifests its peculiar power on the worms, in many cases, without exciting an increased action of the intestinal tube, and hence the usual practice of prescribing a purge

after the exhibition of *Spigelia*. It is far more probable that its efficient vermifuge qualities are dependent on the same principle inducing the narcotic symptoms to which it occasionally gives rise. These are, dimness of sight, giddiness, dilated pupil, spasmodic motions of the muscles of the eyes, and even convulsions. Dr Chalmers attributes the loss of two children, who died with these symptoms, to the use of this article. Dr H. Thompson, who made it the subject of an inaugural dissertation, states, that the effects of large doses on himself, were, acceleration of the pulse, flushed face, drowsiness, and stiffness of the eyelids. The best account, however, of its narcotic powers, is given by Dr Eberle, who observes: "A boy about six years old, after having taken three or four gills of a strong decoction of the root, was suddenly affected with complete mental derangement. The derangement was precisely of that kind, which is sometimes produced by the seeds of stramonium. He distorted his countenance into a variety of shapes, was affected with alternate fits of laughing and crying, and ran and skipped about the room incessantly. The pupils of his eyes were greatly dilated, and his talk was wild and incoherent. These symptoms went off in about twenty hours, and left him as well as before he took the pink-root." These narcotic effects, following the ingestion of the *Spigelia*, have been thought by some to depend either on the roots of another plant gathered with the pink root, or on some parasitic vine which had attached itself to it, rather than to any inherent quality of the remedy. These ideas, however, are wholly erroneous; the small black fibres, which were supposed to appertain to the noxious plant, having been proved by Mr Elliot to be nothing more than decayed roots of the *Spigelia* itself; and the suggestion of those symptoms arising from the admixture of some parasitic vine is too futile to need refutation, more especially as the narcotic properties are more powerful in the roots than in the stems or leaves of the pink-root.

Its use has not been solely confined to cases of worms. As early as 1763, Dr Garden, in a letter to Dr Hope, of Edinburgh, states that he had given it with great success in febrile dis-

eases, which seemed to arise from viscosity in the *prima via*, even where there were no worms voided; this is confirmed by Dr Ives, and in fact, almost every practitioner must have met with instances of its efficacy in those febrile attacks of children, generally known under the name of worm fever, which in a number of cases are induced by irritation of the bowels from other causes than the presence of worms. Of this character is the protracted remittent, with hydrocephalic symptoms, in which the late Dr B. S. Barton, found the *Spigelia* of service. Rafinesque states that it is used among the Osages as a sudorific and sedative in acute diseases.

*Pharm. Preparations and Mode of Administration.*  
The *Spigelia* may be given either in powder or in infusion. The dose of the powder for children is from ten to twenty grains. The infusion, however, being somewhat mucilaginous, and having a sweetish taste, is more readily taken by children. This, as directed by the U. S. Pharm. is,

R.—*Spigeliæ* 3ss.  
Aque bullientis Oj.

Macerate for two hours in a covered vessel, and strain.

This infusion we think is too weak, requiring too large a quantity of the inert menstruum to be taken; the usual prescription is exactly double the quantity of the root. Of this latter infusion, a wineglass full is to be taken at a dose by a child, and a half pint by an adult. One of the best modes of administering it we have found, is to give a large dose of the infusion to a child at bed time, and to exhibit a mercurial or other effective purge in the morning.

Some practitioners prefer giving it combination. Dr Garden, already quoted, and others recommend it in union with the *Aristolochia serpentaria*, not only as adding to its efficacy, but also as counteracting its narcotic qualities.

The most common combination, however, is with some of the purgatives, and especially with Senna; this forms a very celebrated and efficacious nostrum, called worm tea, for which there are several recipes, differing slightly in the quantities



of the different ingredients, or in the omission of one or more of them; one of them which is much used is,

R.—Spigeliæ	℥ss
Sennæ	℥ij
Sabinæ	℥ss
Mannæ	℥ij

Infuse in a pint of boiling water, and strain.

The dose of this compound infusion is much the same as directed for the simple; it generally purges actively, and does not appear to excite the narcotic symptoms as readily as the latter.

A variety of other formulæ for the exhibition of this medicine, are given in the *Pharmacopée Universelle*, of which the following are the most important.

*Decoctum Spigeliæ.*

R.—Spigeliæ anthel.	℥ij
Aqua fluvial.	℥ij
Boil and add, after straining,	
Suc. limon. recen.	℥vi
Syr. flor. pers.	℥ij
Aqua	℥ij

Dose one or two ounces every six hours for an adult.

*Syrupus Spigeliæ.*

R.—Fol. Spigel.	℥ij
Sem. Anisi contus.	℥ss

Infuse for 6 or 7 hours in a water bath, squeeze and filter, and then add

Extrac. jalapæ	℥ss
Sacch. alb.	℥i

Dose, two tea spoonfuls a day to children, a table spoonful night and morning to an adult, in half a cupful of some appropriate vehicle.

*Analysis.* M. Feneulle, of Cambray, analysed some specimens of a *Spigelia*, in 1803, which he supposed at the time to be the *S. anthelmia*, but the authors of the "Dictionnaire

des Drogues," are of opinion that he was mistaken, and that the subject of his researches was the *S. marilandica*; this idea is confirmed by an observation he makes at the commencement of his memoir, that the article under consideration is employed in the United States; now it is well known that whilst the indigenous species is universally employed, the *S. anthelmia* is scarcely known even by name. We will therefore extract such parts of his paper as appear interesting, as a guide for those who may wish to pursue the subject.

1. A portion of the roots, reduced to powder, were subjected to the action of sulphuric ether until every thing soluble was taken up; the ethereal tincture was of a lemon colour, and reddened litmus paper; when distilled to about a sixth, a liquid remained in the retort, which was left to evaporate spontaneously; the ether did not appear to have contracted any particular odour, and no longer reddened litmus paper; the residue, on the contrary, had strong marks of acidity; on diluting it with distilled water, a soft, fat, unctuous substance was separated of an acrid taste, accompanied with a small portion of resin. The aqueous solution precipitated the salts of the peroxide of iron of a black colour; it contained gallic acid, accompanied with a bitter substance.

2. The roots treated with ether, were boiled with rectified alcohol; this liquid, on being filtered, deposited nothing on cooling; on distilling it, a residuum was obtained, formed of resin, an oil of a greenish colour, a little acid, and a bitter substance.

3. A fresh portion of roots were macerated in distilled water for some hours; on filtering a part of this infusion, and boiling it, an inconsiderable coagulum was formed, which burnt like animal matter, was soluble in potash, and which was found to be albumen. The remainder of the infusion was distilled, and afforded a product of an aromatic odour, slightly nauseous, not affecting litmus paper, but occasioning a cloudiness in solutions of acetate of lead and nitrate of silver; the decoction remaining in the retort, on being filtered, remained perfectly transparent; its colour was brown, its taste bitter and

astringent. Acetate of lead, on being added to it, occasioned a yellowish white precipitate, which being collected on a filter and well washed, was suspended in distilled water, and decomposed by sulphuretted hydrogen; filtered and evaporated to dryness, the residue treated by alcohol, gave a white soluble matter having acid characters, being in fact an acid malate of lime, &c.

The decoction, freed from the precipitate formed by the acetate of lead, was deprived of the excess of this salt, by hydrosulphuric acid, filtered to separate the sulphuret of lead and evaporated to dryness; on treating this extract with alcohol, a coloured substance of a sweetish taste, soluble in water, &c. was left, and the menstruum took up a matter, having a bitter taste, and of a brownish colour, which appears to be the active principle of the *Spigelia*. Taken internally it occasions vertigoes which last for some hours, and is purgative.

It results from this examination that the roots of the *Spigelia* contain

A fat oil,

Volatile oil,

Resin in very small quantity,

A bitter substance in which the vermifuge power appears to reside,

Muco-saccharine matter,

Albumen,

Gallic acid,

Malates of lime, potash, &c.

Woody fibre.

M. Fenuelle, also analysed the leaves; these gave much the same products, except that there was a notable proportion of chlorophylline and less of the active bitter substance.

ARTICLE II.—*Pharmaceutical Notices, No. 3.*

[We are happy to find this department of the Journal is attracting attention, as a proof of which, it will be seen, that the following notices are derived from two different sources. For the latter part we are indebted to a distant correspondent, who we trust will redeem the promise which he has made of furnishing an account of the value of the different processes for the extraction of morphia.]

To many readers of the Journal of the College of Pharmacy, the short essays which have recently appeared under the above head have doubtless been gratifying. These essays will form a vehicle for the interchange of practical experience, and the communication of many small matters, which are of real importance to the professors of an art depending so much, as does that of pharmacy, on little items of accuracy and precision of manipulation. The editor will allow me a remark or two on the last number of this series (vol. iii. pp. 290, 291); and a few observations on the subject of emulsions generally, which I shall endeavour to condense from the rough notes made at various times, as the occasions occurred.

The *coagulation* of the *mixture of Epsom salts*, *magnesia*, *tincture of colchicum*, &c. mentioned on page 290, is an instance of what I have frequently observed to take place in mixtures containing *magnesia* with a vegetable tincture. I may instance in particular, a mixture of *assafoetida* with *magnesia*, commonly known as *Dr Dewees's Carminative*; which, after standing a few days, frequently becomes as solid as butter. This, however, does not occur so readily, when made with calcined *magnesia*, as when the carbonate is employed. The first instance of this change, that I remember noticing, was a mixture of *Epsom salts*, *magnesia*, *tincture of jalap*, and infusion of *senna*; which, after standing a day or two, became completely gelatinous, so as to induce a suspicion, in the mind of the patient, of some inaccuracy in the preparation of the pre-



scription. Can this be the result of any change effected in the constituents of the tincture, similar to the effect of magnesia on copaiba balsam? It seems to merit further investigation.

Your correspondent in the same paper, on the subject of *emulsions*, says that, "as a general rule, the mucilage should be made about the thickness of the substances we wish to suspend." My own experience does not agree with him here, and I cannot think well of this direction as a general rule. If the mucilage is to be made of the same thickness as the substance to be suspended, it may answer very well with castor oil, copaiba balsam, and some others; but how shall we manage, when we wish to suspend oil of turpentine, or camphor, or ether, or myrrh, or almonds, or gum ammoniac, or oil of aniseed, or assafœtida, all of which are frequently ordered in the form of emulsion? In these cases the mucilage should not surely be of the same consistence as the substance to be suspended.

Where the substance we wish to suspend is fluid, the mucilage, or other matter intended to serve as a suspensory, should be of a consistence between common syrup and molasses. The white of egg, which is often ordered here by physicians, is seldom sufficiently viscid; and indeed I have sometimes found it impracticable to form a perfect emulsion with it, without the addition of a small quantity of powdered gum arabic. The *vitellum*, which is thicker than the white, makes a more perfect emulsion; and where the mixture is not likely to be kept more than twenty-four hours, and the circumstances of the patient would not render its exhibition improper, it is decidedly preferable. A thick mucilage of gum arabic, however, such as the *mucilago acaciæ* of the United States Pharmacopœia, consisting of four ounces of gum to half a pint of water, appears to me to be the best article in common use for the suspension of oils.

In making an emulsion, a good deal depends even on so slight a circumstance as the form and material of the mortar and pestle. An emulsion may, indeed, be made in a smooth porcelain mortar; but the process is unquestionably more successful and easy in a wedgwood one, and still more so in the old-fashioned

marble mortar which is generally used to this day by the druggists and apothecaries in England. But whatever be the composition of the mortar, it is essential that it should be perfectly *round* at the bottom; not flattish, as is sometimes the case; and the pestle should be so formed as in its motion to leave no hollows between its base and the concave surface of the mortar. Otherwise the emulsion will most probably be imperfect. The mucilage or other viscid substance should always be put into the mortar before any thing else: the oil (or balsam) may then be very gradually rubbed in, taking care to add it no quicker than it can be subdued by the pestle, and if, during this part of the manipulation, the mixture should begin to assume a breaking or curdling appearance at the edges, a few drops of water must be immediately incorporated with it, before adding the remainder of the oil. For want of this precaution I have often known an emulsion suddenly to lose its tenacious consistence in the mortar, and it is then in vain to endeavour to restore it. After the oil is thoroughly incorporated, some care is requisite to avoid separating it again by too hasty an effusion of the water or other fluid of the mixture; and if any alcoholic or acid liquid is to be added, it must be at the very end of the process. Indeed an acid liquid, even a slightly acescent syrup, will often entirely destroy the emulsion. Mixtures of copaiba are frequently spoiled by the addition of Spir. Œth. nit.; which might be avoided by first diluting it with one or two portions of water.

*Sulphuric Ether* is sometimes ordered by physicians to be dissolved in water by first rubbing it with a little spermaceti. This latter substance of course afterwards floats on the surface of the water and requires straining off; and whilst the mixture is thus exposed to the air, a portion of the ether evaporates. This might be in great measure avoided, by rapidly filtering the mixture through *good* filtering paper, keeping the funnel closed at the top.

*Oil of Turpentine* may be suspended by rubbing it in water with magnesia; but the emulsion thus formed is neither so complete nor so permanent as that obtained by the use of gum arabic.

Two drachms of gum, rubbed up carefully with half a fluid ounce of oil of turpentine and two ounces of water, makes a beautiful milk-white emulsion, which does not soon separate. I have kept a mixture, made in these proportions, upwards of twelve months, at the end of which period it appeared as good as when recently made.

*Spermaceti* may be made into a pretty good emulsion by the assistance of mucilage or *vitellum ovi* and sugar, but is apt to separate by standing. Myrrh, gum ammoniac, and assafoetida emulsions, are best when rubbed down very carefully and gradually with water only; by which means they make a whiter milk than when gum or sugar is used in the process, and the impurities may then be readily separated by decantation. The powdered myrrh should never be taken for emulsions, but the richest, most fatty pieces of the fresh drug.

*Camphor* is a medicine of so great value to the physician, in cases where speedy efficiency is requisite, that it is to be regretted it should be so often ordered wrapped up in the untractable form of a hard pill. In cases where a large dose is to be taken, a good form is the emulsion prepared by rubbing down one drachm of camphor in two ounces of water by means of ten grains of the best Turkey myrrh. The most elegant, however, of all the forms in which camphor can be exhibited, and probably also the most efficient, is its actual solution in water. It is well known that water simply poured on the powdered camphor, as directed by the London Pharmacopœia, takes up only a very small portion, barely sufficient to impart a flavour. By friction with magnesia, and subsequent filtration, a much larger quantity is dissolved. I have taken some pains to ascertain its solubility, and the various circumstances by which this is modified. I find that when the directions of the London Pharmacopœia are followed, one pint of water takes up only thirteen grains of camphor. One pint of water, however, at a common temperature, rubbed with two drachms of camphor and twenty grains of calcined magnesia, dissolves fifty grains. When one drachm of magnesia is employed, (which is the

proportion adopted by the United States Pharmacopœia,) the quantity dissolved is the same. One pint of water rubbed with carbonate of magnesia dissolved only thirty-five grains; but with prepared chalk fifty-three grains were dissolved.

W. HODGSON, JUN.

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*Rochelle Salts.* The last edition of Coxe's Dispensatory gives the following formula for making Rochelle salts. "Take of subcarbonate of soda, 20 ounces; supertartrate of potass two pounds; boiling water 10 pints; dissolve the carbonate of soda in the water, and gradually add the supertartrate of potass, filter the solution through paper, evaporate until a pellicle be formed, and set it aside to crystallize, pour off the liquor and dry the crystals on blotting paper."

There is a great deal too much said here, for it is not necessary to filter through paper; if as much water as ten pints be used to dissolve the subcarbonate of soda, it will subside much quicker than it can be filtered; and it is impossible to crystallize Rochelle salts, if the solution be evaporated until a pellicle appears, for in this case, (if it does take place at all) the salt would be completely decomposed. The proper mode is to evaporate until a drop, when allowed to cool on a plate of glass, presents a well defined crystalline group; I say well defined, for if the appearance be at all confused, the solution has been too much evaporated, and fine crystals cannot be obtained. This salt is often adulterated, when in powder, with sulphate of soda; this, however, may be readily detected by muriate of barytes; occasionally it is sophisticated with muriate of potass, which can be discovered by calcining the salt, dissolving in distilled vinegar, and adding nitrate of silver, which precipitates the chloride.

*Nitrate of Silver*, is frequently adulterated with nitrates of potass and of lead; to detect the former, mere inspection is sufficient, as the genuine article is somewhat transparent, and



when broken, presents the appearance of crystalline radii emanating from a common centre, whereas, if nitre has been added, it will give a compact stony fracture, having no appearance of crystallization. If nitrate of lead has been added, a white precipitate will occur on adding an excess of caustic ammonia to its solution. If copper be present, it will be deliquescent, which it never is in a pure state.

*Sulphate of Morphine.* This valuable article is frequently adulterated with sulphate of quinine, and as many druggists consider it to be better on account of its insolubility, and from its requiring the addition of an acid to dissolve, this notice may induce them to suspect it, if it be not perfectly soluble in double its weight of water. To detect its adulteration, form a saturated solution of sulphate of quinine, by boiling it in distilled water; weigh out ten grains of the sulphate of morphine, place it on a filter, and pour on it the solution of the sulphate of quinine as long as a drop, when filtered, strikes a red colour with nitric acid, the insoluble residue will be sulphate of quinine or other impurities, but most likely the former, from its resemblance to the sulphate of morphine, inducing its use for the purpose of sophistication. In many samples of what was termed genuine and imported from France, from 15 to 25 per cent of the sulphate of quinine have been detected.

*Iodides of Mercury.* If a small quantity of iodine and metallic mercury be triturated together, till an impalpable powder is formed, and the mixture be introduced into a long glass tube and subjected to a moderate heat, a sublimate of a bright scarlet, and one of a brilliant yellow will result; if the yellow product be pressed firmly against the side of the tube by means of a glass rod, it will immediately change into a bright scarlet; if the portion which has thus been changed, be boiled in common alcohol, it will resume its yellow colour, and if again pressed even on paper, it will again change to a scarlet, satisfactorily proving, at least to me, that the yellow and red iodides of mercury are identical in composition, and that they

owe the difference of colour which they present, merely to a different crystalline arrangement of their particles.\*

*Morphine.* I am manufacturing this article largely, and have subjected twelve pounds of opium to each of the various modes recommended, as I had previously done with ounces, which I consider too small a quantity to give a satisfactory comparison. Meanwhile, I can state with certainty that the plan advised by Dr Staples is the most expensive, that of Robiquet the most productive, and that of Faure the most easy. On the termination of my experiments on a large scale I will, however, transmit fuller details on the processes and their results.

*Tartaric Acid.* The following method of making tartaric acid, answers extremely well on a small scale, but I have not yet tried with large quantities. To finely powdered bi-tartrate of potass, add one fourth of its weight of sulphuric acid and rub it up into a paste, so as to incorporate the ingredients thoroughly, adding merely a sufficient quantity of water to form an uniformly tough mass. Put this into a linen bag, and pour on it cold distilled water, as long as the droppings will redden litmus paper. Evaporate slowly and crystallize. Sulphate of potass remains in the bag. The solution must be tested to prove the absence of any excess of sulphuric acid, by a solution of acetate of lead, and the precipitate thence resulting must be entirely soluble in dilute nitric acid.

\* The above observations of our valued correspondent, on the iodides of mercury are extremely interesting, and at first view, would certainly seem to corroborate the inference he has deduced, though this is an erroneous one. Dumas, in speaking of the bi-iodide, or red iodide of mercury, says, "this compound is of the most brilliant red colour. It is fusible and volatile; but its fumes condense in spangles or in dust of a yellow colour. This, after some time, regains its red colour. The least friction suffices to restore it to its natural appearance immediately. It is very probable that the yellow and red states depend on some isometrical phenomenon which requires a close examination." Our correspondent likewise mentions the change of colour which takes place on the red coloured bi-iodide being boiled in alcohol, but does not say whether it was soluble or not, which would have settled the question of identity, as the sesqui or yellow iodide is insoluble in that liquid, whilst the bi-iodide is taken up by it.—Ed

A very beautiful acid may be more expeditiously, but more expensively made by substituting diluted alcohol for the water in the above process. A.

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ARTICLE III.—*Notes on Hydrocyanic Acid.* By R. Eglesfeld Griffith, M.D.

There is perhaps no medicinal preparation, on which so little reliance can be placed, as on that of hydrocyanic acid; this arises from many causes, the chief of which are, want of uniformity in the mode of making it, and its liability to spontaneous decomposition, even when protected from solar and atmospheric influences. As, however, the most ample proofs have been afforded of its remedial powers; in a variety of diseases, it is important that the best of the several methods which have been devised for its preparation, should be adopted, and all others wholly laid aside; at present one Pharmacopœia orders the acid made according to Scheele's process, another enjoins Gay Lussac's preparation, diluted to a certain degree, whilst a third gives that of Vauquelin as the best.

In this state of things, we have thought that a condensed view of the subject might not prove uninteresting, although claiming no stronger title to originality than the mere arrangement of the materials, which have been collected from a variety of sources, but principally from the recent papers of Berzelius, Vauquelin, Robiquet, &c.

The first who obtained the hydrocyanic acid in a separate form, was Scheele, about 1780, during a course of experiments on the nature of Prussian blue.

*Process of Scheele.*—To 128 parts of Prussian blue (ferrohydrocyanate of iron) and 64 parts of the red oxide of mercury (peroxide) are to be added 500 parts of distilled water, and the whole put into a capsule and boiled for twenty minutes,

constantly stirring the mixture with a wooden spatula; it is then permitted to settle, filtered, and the precipitate washed with 128 parts of boiling water; the two fluids are then to be mixed and poured into a matrass, and 96 parts of finely powdered iron scales and 24 parts of sulphuric acid at 66° added to them. The mixture is to be well shaken, and the vessel plunged into cold water for an hour. The fluid is then to be decanted into a tubulated retort placed in a sand bath; to the neck of the retort is to be attached an adapter which is connected with a tubulated globe, from which proceeds a bent tube, the extremity of which is plunged into a vessel containing water. The apparatus must be well luted, and the globular receiver covered with wet cloths; a gentle heat is now to be applied until 192 parts have passed over. To this liquid is to be added eight parts of carbonate of lime, and it is to be again distilled: this will afford 128 parts of acid.\*

The disadvantages of Scheele's acid are, from the difficulty of uniting the same circumstances in every operation, that there is never a decided proportion of real acid to the water with which it is mixed, and its extreme liability to decomposition.

Scheele's experiments were repeated, and greatly extended by Berthollet in 1787; from this time to 1806 but little additional light was thrown on the subject, when Proust, in a series of well conducted investigations on both the acid and its compounds, enriched chemistry with a great number of new and important facts, which paved the way for the subsequent discoveries of Gay Lussac, who was the first to lay before the world an easy process by which the acid might be obtained in a pure and concentrated form.

*Process of Gay Lussac.*—Put into a small tubulated retort, a mixture of cyanide of mercury and hydrochloric acid, the quantity of acid being less than is requisite to decompose the cyanide completely. To the beak of the retort is to be fitted

\* Scheele's Chemical Essays.



a glass tube about two feet long, and six-tenths of an inch in diameter; the third of this tube nearest to the retort, is to be filled with small fragments of white marble, to retain any hydrochloric acid that may pass over, which, however, is to be as carefully guarded against as possible; the remainder of the tube is to be filled with chloride of calcium, in order to absorb any aqueous vapours. To the extremity of the tube is to be adapted a small receiver, which is to be surrounded with ice or a freezing mixture. A gentle heat is to be applied to the retort, when the hydrocyanic acid will pass over and condense, first on the marble, from which it is to be disengaged by heat and gradually driven along the tube into the receiver.\*

This process will afford a pure acid, but much too powerful for medicinal purposes. Magendie has therefore directed in his formulary, that it should be mixed with six times its volume or 8.5 times its weight of distilled water. This process of Gay Lussac has been adopted with some variations by Robiquet; after, however, having obtained the acid, which has a density of 0.7, he orders it to be diluted with two parts of water only, thus forming a medicinal acid of the density of 0.9.

This difference of the medicinal hydrocyanic acids of these two chemists should always be borne in mind, as fatal consequences might result from using them indiscriminately, or in the same doses. The disadvantages of both Gay Lussac's and Robiquet's processes are, that the preparation of the anhydrous acid always exposes the operator to some danger, and that the products are so readily decomposed; at the same time, by adopting one or the other as a standard of strength, we are enabled to administer a definite quantity, which can never be the case, where Scheele's acid is employed. Magendie states that the French physicians consider this as so much weaker than the medicinal acid of the codex (Magendie's), that they often order it to the amount of a drachm to a mixture of four ounces, to be taken in spoonful doses; and the Parisian apo-

\* *Ann. de Chim.* t. 68, p. 128, and t. 95, p. 136.

the caries are so accustomed to see Scheele's acid entering in large quantities into the composition of medical prescriptions, that, in order to prevent accidents, they prepare their acid by mixing that of Gay Lussac with forty parts of water. This dilution admits of their making up prescriptions without danger, when they find, by the extent of the dose ordered, that the physician meant Scheele's acid.\*

*Process of Vauquelin.*—Take one part of cyanide of mercury, and eight parts of distilled water, dissolve, and pass a current of hydro-sulphuric acid gas through the solution, till there is an excess of the acid. Filter to separate the sulphur which is deposited, and add a sufficient quantity of carbonate of lead, finely powdered, to saturate the hydro-sulphuric acid, agitate the mixture, and filter, when the hydro-cyanic acid will be obtained, of the same density as that by Scheele's process.† This plan is adopted by the United States Pharmacopœia and others, but has the disadvantage of not giving a preparation of an invariable strength. A modification of this process has been proposed by M. Caillot; which is to employ only four parts of water instead of eight, and to add to the acid four parts of alcohol at 40° to replace the four parts of water omitted. This modification was to obtain a preparation which would keep for an indefinite period.

*Process of Van Mons.*—Dissolve thirteen parts of cyanide of mercury in water and introduce the solution into a tubulated retort containing three parts of iron scales; pour on the mixture ten parts of sulphuric acid, diluted with three times its weight of water; stir with a wooden spatula till all the mercury is separated; place the retort on a sand-bath, and heat to ebullition; distil off 117 parts, and rectify by another distillation.

This is by no means a good plan, as it always gives an acid mixed with variable proportions of water.‡

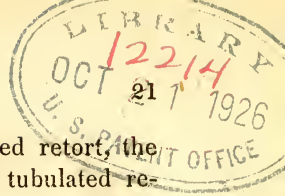
*Process of Gea Pessina.*—Take hydro-ferrocyanate of po-

\* Magendie's Formulary, translated by J. Houlton, 1823.

† Pharmacopée Universelle.

‡ Ibid.

*Notes on Hydrocyanic Acid.*



tassa, eighteen parts, introduce it into a tubulated retort, the beak of which is connected with a very small tubulated receiver, provided with a safety tube, the extremity of which is inserted in a vessel containing a little distilled water; add a mixture of sulphuric acid of 66°, nine parts, and distilled water twelve parts. After a reaction of twelve hours, during which the receiver must be constantly kept surrounded by ice, the retort is to be gently heated; the fire is to be extinguished as soon as a blue matter is formed, which threatens to pass into the receiver.\*

According to the observations of Henry, Jun., this preparation is easily preserved, and by diluting it with sufficient water to give it a density of 0.980, it will be of the same strength as that ordered by Magendie, with the advantage of being much more readily obtained and capable of being kept for an indefinite time without alteration.

*Process of Trautwein.*—Introduce 15 ounces of hydrocyanate of potassa in powder, into a tubulated retort placed in a sand bath, and adapt it to a receiver plunged in a frigorific mixture; nine ounces of sulphuric acid diluted with an equal weight of water are to be poured on the salt, the apparatus luted, and the mixture distilled by a gentle heat. This will give four to five ounces of hydrocyanic acid diluted with water. This acid is to be poured into a strong bottle placed in the frigorific mixture, and dry chloride of calcium gradually added, till a liquid mass is formed, on the surface of which an ethereal fluid may be perceived; this fluid is to be separated, and a little more chloride of calcium added, when it is to be distilled, with the same precautions as before. This gives an acid of 705° to 710°, which, when diluted with six times its volume or eight and a half times its weight of distilled water, will give a medicinal acid of 0.982. Mr Trautwein states that the pure acid can be preserved for nine months, without any alteration.†

\* Journ. de Pharmacie, t. 9, p. 15.

† Ibid. p. 239.

The German and Batavian Pharmacopœias contain several formulæ for the preparation of alcoholic hydrocyanic acids, of which we have space for two only.

*Process of Keller.*—Take four parts of hydroferrocyanate of potassa, dissolved in sixteen parts of distilled water, and add a mixture of three parts of sulphuric acid of 66° and twelve parts of alcohol; permit the whole to digest in a gentle heat, stirring it often; decant the limpid portion, and distil in a retort, till the product has twenty times the volume of one part of water. The density of this acid is 0.900.\*

*Process of Ittnerr.*—Take hydroferrocyanate of potassa, four ounces; introduce it into a retort and add a mixture of sulphuric acid of 66° two ounces, and water four ounces. Distil, almost to dryness, into a receiver containing pure alcohol, eight ounces. Digest the product for some hours on a drachm of calcined magnesia, and distil off six ounces, which are to be received into a vessel containing two ounces of rectified alcohol.†

Notwithstanding the alcohol in this preparation, it is liable to decompose; it is, however, stated by M. Schutz, that if, when it begins to turn yellow, it again be distilled over calcined sulphate of zinc, that a colourless acid is obtained which is of great strength and will preserve its qualities for years.‡ Besides these methods for the preparation of the acid of various degrees of strength, we have lately been presented with others to obtain it without distillation, by decomposing some of its salts. The first to propose this was Mr Clark of Glasgow, whose paper on the subject will be found in our last number. This method, as will be seen, consists in dissolving one drachm of tartaric acid in an ounce of water in a bottle, adding twenty-eight grains of cyanide of potassium, closing the bottle and shaking well, &c. This preparation, he says, corresponds with the strength of Vauquelin's acid, that of Magendie being four times as strong. This plan of Mr Clark's has been slightly

\* Pharmacopée Universelle.

† Ibid.

‡ See Journal of Pharmacy, Vol. I. p. 235.



modified by Mr Laming of London, whose formula will also be found in our last number.

At the first glance, this mode would appear to offer great advantages; the acid could be made as it was wanted, and of a definite strength; but on a closer examination of it many difficulties of no slight character present themselves; these are fully stated by Mr Robiquet in his report to the Parisian School of Pharmacy; on Mr Clark's process,\* he observes, "is it always the fact, as Mr Clark supposes, that by closely adhering to this formula, that a medicament is obtained which is always identical and equal to the acid prepared according to other processes. Mr Clark adds to the cyanide of potassium only the exact quantity of tartaric acid necessary to transform all the potassa into a bitartrate, but who is ignorant that these kinds of decompositions are seldom complete, and that, with very few exceptions, they require an excess of the precipitating body, especially when the precipitate is not wholly insoluble. It is therefore more than probable that a portion of the cyanide of potassium remains unaltered in the solution, besides a portion of tartaric acid and bi-tartrate of potassa." But the greatest objection in M. Robiquet's opinion is the want of purity in the cyanide used, for if prepared according to the plan proposed by Mr Clark, it will seldom be identical, and will in fact be always more or less mixed with subcarbonate of potassa, from the prompt alteration of the cyanide when it comes in contact with water. If this be the case, as is most probable, the great value of Mr Clark's process is destroyed, that of affording a medicine of invariable strength and not subject to those alterations to which the hydrocyanic acid procured by the former methods is always liable.

If Mr Clark's plan be employed, it is of great consequence that the cyanide of potassium be perfectly pure. As commonly found, it is black and mixed with carbonaceous and ferruginous matter, as this is the only mode in which it can be kept in an unaltered state for any length of time; this is no disadvantage

\* Journ. de Pharm. Nov. 1831.

when used for the preparation of hydrocyanic acid by distillation, instead of the cyanide of mercury, as recommended by Gay Lussac; but is of the most vital importance if employed to make the medicinal acid of Mr Clark. Besides the mode of obtaining it given by the latter, several others have been proposed, among which those of Robiquet and Tilloy appear to be the best. Robiquet observes, "to obtain it pure, I fuse the impure cyanide perfectly; by keeping up this fusion for some time, a portion of the cyanide of potassium will float over the iron and charcoal will occupy the bottom of the retort. After cooling, I detach this layer with care; but this cyanide, the only one which is really pure, and which alone should be employed in medicine as a substitute for the hydrocyanic acid; this cyanide, I say, is too dear, and it was requisite to form a salt which should be at the same time white and cheap. To fulfil these two conditions with as little alteration of the salt as possible, I dissolve the impure cyanide in a very small portion of water, which produces a great diminution of temperature. I filter, and immediately and rapidly evaporate to dryness, in a platina capsule, and when the whole is reduced to dryness, increase the heat till it fuses."

Tilloy prefers calcining the ferro-hydrocyanate of potassa, separating the cyanide of potassium from the quadricarburet of iron by absolute alcohol, on distilling which the cyanide of potassium is obtained very pure and white. His reason for using absolute alcohol, is because he supposes that a complete decomposition of the cyanide of potassium takes place when it is dissolved in water. This is denied by Robiquet, who asserts that the reaction is slow, and stops at a certain point. He says that he has kept very weak solutions of it for several months, without the whole of the cyanide being decomposed.

From the above it will be perceived that all the processes hitherto devised are attended with certain drawbacks; some give an acid of variable strength, others an acid which, although pure, is extremely liable to decomposition, and that the plans for making it extemporaneously are also defective in the same

important particulars. The best appear to be those of Vauquelin, Robiquet and Gea-Pessina; but the most desirable point connected with the subject, is, that all the Pharmacopœias should adopt one of the modes, and that acids made by any other should not be prescribed. In the present state of things, when each druggist's shop may be provided with an article made by a different process and varying in strength, a physician should carefully note in his prescription which of the acids he intends, or fatal consequences might ensue, without any blame attaching to the apothecary. It is stated in the *Dictionnaire de Matière Medicale* of Merat and De Lens, "that, at the central Pharmacy (at Paris) they only prepare the acid of Scheele, and consequently in the hospitals, even where the medicinal hydrocyanic acid is prescribed, no other is used."

Since writing the above we have met with another mode of preparing a medicinal acid, devised by Mr Tilloy, which will be found in the Miscellany. This article he states is of invariable strength, and is not altered by age.

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ARTICLE IV.—On the *Anda Gomesii*. By Franklin R. Smith.

Some time since, a small quantity of oil, with specimens of the nuts from which it was obtained, both in a perfect state and also powdered, was sent to this city from Rio Janeiro by Dr Ruschenberger of the United States navy. As this is probably the first that has reached this country, it is hoped that a short notice of the tree and its products may not prove uninteresting.

The account transmitted with those articles, stated that the nuts were the fruit of the *Joannesia princeps*, a large tree belonging to the natural order EUPHORBIACEÆ, growing in the

botanic garden at Rio Janeiro, having a whitish bark and rising to the height of 40 or 50 feet. Like many other medicinal plants, however, great confusion has existed in its synonyms. From the limited investigation we have been able to make respecting it, it appears that it was described by Piso in his Hist. Nat. Brazil, in 1618, under the native name of *Anda*. Margrave, who also wrote on the productions of that country, likewise notices it, but figures a different plant. So little additional information was obtained respecting it until the time of Gomez, that it is not described by Linnæus; and Jussieu in his Gen. Plant., observes, that in all probability it is analogous or identical with *Aleuteris*. By Gomez it was erected into a genus under the name of *Joannesia*, which, however, was changed by A. Jussieu into that of *Anda*, its original appellation, as the former was preoccupied by a genus of Carduaceous plants. This uncertainty and confusion is remarkable, as the tree appears to have attracted the attention of travellers in no slight degree, from its beauty and the medicinal properties attributed to it. Piso terms it "arbor vasta atque elegans."

The bark is lactescent and poisonous, and a decoction of it is used by the natives for the purpose of stupifying fish. The most important part, however, is the fruit; this is about the size of an apple, of an ash colour. Upon removing the external husk, a nut is presented to view, of a round form and about two inches in diameter. It has four elevated ridges arising from its insertion and produced at the opposite extremity into a sharp point. The lateral ridges are interrupted near the upper end of the nut by two fissures, one on each side of the acumination. The shell is hard and ligneous, and, when broken, exhibits two cells, each containing one seed, about twice the size of a chesnut, and furnished with a very hard brownish shell of one-fourth of a line in thickness.

These kernels are cathartic in doses of from one to three, and have been employed from time immemorial by the natives, who prefer them to any other remedy of the kind. The husk is commonly used as an astringent in diarrhœa, as well as to moderate the effects of an overdose of the kernels.



To obtain the oil, the kernels are decorticated, pounded in a mortar, and afterwards subjected to pressure. By this treatment, they yield a clear pale yellowish oil, destitute of taste and almost without smell; at ordinary temperatures it is as fluid as olive oil, and is used by the natives for burning, for painting, and for anointing their bodies.

As our accounts of its activity as a cathartic were vague and unsatisfactory, I was desirous of ascertaining its real value, and for that purpose placed it in the hands of Dr Norris, resident physician of the Pennsylvania Hospital, in order that a fair trial might be made of it. As the result of his experiments with it, it may be stated that in doses of 50 drops it generally induced one evacuation; in one case in which the dose was increased to 60 drops, several alvine discharges were the consequence.

Like the other remedies furnished by the Euphorbiaceæ, it will occasionally nauseate; in one patient, a female of a scrofulous diathesis, it produced copious vomiting, half an hour after its administration.

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ARTICLE V.—*Notes on the Pharmacopœia of the United States. By Daniel B. Smith.*

As the Pharmacopœia of the United States for 1831 is winning its way to general adoption, and will probably be acknowledged as the standard throughout the Union, I have thought that a comparison between its formulæ and those of the British Colleges would be interesting. It will probably satisfy those who still hesitate about the propriety of adopting it, that there is not so great a diversity as they may have been led to expect. The following list comprises those preparations in which the formulæ agree with the London College.

Where the formulæ also agree with those of Edinburgh or Dublin, the letters E. or D. are affixed.

Ceratum Plumbi subacetatis.	Mistura Amygdalæ.
Saponis.	Assafœtidæ.
Decoctum Cinchonæ, D.	Ferri Comp.
Dulcamaræ.	Mucilago Acaciæ, E. D.
Hordei, E. D.	Spiritus Juniperi Comp. E. D.
Lichenis.	Lavandulæ, E.
Sarsaparillæ Comp.	Myristicæ.
Senegæ, E.	Pimentæ.
Veratri.	Tinctura Aloes Comp. D.
Extractum Colocynth. Comp.	Assafœtidæ.
Ferri Muriatis Tinctura.	Benzoini Comp. D.
Infusum Angusturæ.	Camphoræ, D.
Anthemidis, E.	Cantharidis.
Armoraciæ.	Capsici.
Cascarillæ.	Castorei.
Cinchonæ.	Catechu, D.
Colombæ.	Cinnamomi.
Lini.	Colombæ.
Rhei.	Digitalis, D.
Rosæ.	Gentianæ, D.
Tabaci.	Guaiaci.
Pilulæ Ferri Comp.	Ammoniata, E. D.
Hydrargyri, D.	Hellebori Nigri.
Pulvis Ipecacuanhæ, Comp. E. D.	Humuli.
Syrupus Simplex.	Hyosciami.
Aurantia.	Jalapæ.
Limoni.	Myrrhæ.
Confectio Amygdalæ.	Opii, D.
Aurantia, D.	Scillæ, D.
Rosæ, E. D.	Serpentariæ, D.
Sennæ.	Valerianæ, D.
Emplastrum Ammoniaci, D.	Unguentum Cantharidis,
Ferri.	Hydrargyri, D.
Galbani Comp.	Oxydi, E.
Plumbi.	Picis, D.
Resinæ.	Sulphuris.
Linimentum Camphoræ, E. D.	Veratri.
Terebinthæ.	Zinci, E.
Mistura Ammoniaci.	Vinum Opii, E.

The formulæ of the following list differ from the London and agree with those of the Edinburgh College. Those pre-

parations which are not ordered in the London Pharmacopœia are marked with an asterisk.

Ceratum Resinæ.	Aqua Aurantii Corticis.
Cetacei.	Rosæ.
Emplastrum Hydrargyri.	Confectio Aromatica.
Assafoetidæ.*	Infusum Gentianæ Comp.
Ferri.*	Quassia.
Oxymel Scillæ,* D.	Linimentum Calcis.* D.
Pilulæ Aloes.	Pulvis Aromaticus.
et Assafoetidæ.*	Spiritus Lavandulæ Compositus.
et Myrrhæ.	Syrupus Scillæ.*
Rhei Comp.*	Colchici.*
Tinctura Cardamomi.	Trochisci Glycyrrhizæ et Opii.*
Rhei.	Carbonatis Calcis.*
et Aloes.*	Vinum Gentianæ Comp.
et Gentianæ.*	Rhei.*
Saponis Comp.	Antimonii.
Tolutani.*	

The following list differs from the London and Edinburgh formulæ, and coincides with those of the Dublin College. Those marked with a dagger are not ordered by the other British Colleges.

Acidum Sulphuricum Aromaticum.	Infusum Valerianæ.†
Confectio Scammonii.	Pulvis Aloes et Canellæ.
Emplastrum Calefaciens.†	Unguentum Carb. Plumbi.
Tinctura Angusturæ.	Simplex.
Quassia.	Vinum Ipecacuanhæ.
Moschi.†	

The following preparations differ from those of the British Colleges.

The *acetum colchici* and *acetum scillæ* are of the same strength with those of the London College, containing half a fluid ounce of alcohol to the pint, in place of a fluid ounce of proof spirit. The *alcohol ammoniatum aromaticum* contains the oils of cloves and cinnamon, in addition to those of rosemary and lemon, ordered by the Edinburgh College.

The remaining *aquæ medicatæ* are prepared by triturating the essential oils with magnesia, a simple and elegant mode of

preparation. The *cerate of cantharides* supplies the place of the cantharides plaster of the British Colleges, and contains one third; the London plaster contains two-sevenths; the Dublin three-tenths; and the Edinburgh one fourth of flies. Our own is therefore the most certain preparation. The *ceratum sabinæ* is prepared by mixing two ounces of powdered savin with a pound of resin cerate. The difficulty of procuring recent savin probably induced the convention to direct this formula, as powdered leaves of an excellent quality are imported from London. Dr Duncan says, the ointment, when thus made, is intolerably acrid and almost caustic, and that its use should be discontinued. Our own experience has been different, and we have found it a safe and efficacious irritant. The *ceratum simplex* differs from any of the simple cerates of the British Colleges, but is well suited to our climate. The *confectio opii* is of the same strength as that of London and Dublin, merely differing in substituting the *pulvis aromaticus* of Edinburgh. The *infusum digitalis* differs from that of Edinburgh in substituting *tincture* for *spirit* of cinnamon. The strength of this preparation in all the Pharmacopœias is alike.

The *infusum sennæ* is of the same strength with that of the Dublin College, substituting coriander for ginger. The *linimentum ammoniæ* contains a fifth, that of London a third, and those of Edinburgh and Dublin a ninth part of water of ammonia. The *linimentum saponis* agrees with the London and Dublin Colleges; except that a fluid drachm each of oils of rosemary and origanum, and a pint of alcohol are substituted for a pint of spirit of rosemary, and animal soap in place of soap of olive oil. The *mistura cretæ* is double the strength of that of the British Colleges.

The *syrupus allii* is made in the same manner as the syrup of squills, and will, we think, be generally regarded as an improvement. The *syrupus zingiberis* is made from the tincture, which is four times the strength of the English preparation, and answers extremely well for this purpose. When made in



the common manner by boiling the root in water, the syrup becomes loaded with the fecula of the ginger and is very apt to spoil.

The *tinctoria aloes* contains the same proportions of aloes as the Edinburgh, and half that of the London and Dublin Colleges. Its alcohol is stronger than that of the British. The *tinctoria cinchonæ* contains six ounces, that of Edinburgh and Dublin four, and that of London seven ounces to the quart of alcohol. The *tinctoria cinchonæ composita* merely substitutes red saunders for cochineal.

The *tinctoria opii camphorata* is that of the Dublin College, adding half an ounce of liquorice and two ounces of honey.

The *tinctoria sennæ et jalapæ* is the *tinctoria sennæ comp.* of Edinburgh, adding half an ounce of caraway and two drachms of cardamom seeds.

The *unguentum gallæ* contains an eighth, that of Edinburgh a ninth part of galls. The *unguentum hydrargyri ammoniati* contains a ninth, that of the British Colleges a thirteenth part of white precipitate.

The *unguentum hydrargyri nitratis* is made with the same proportions of mercury and acid as are used by the London College; and the same proportions of fatty matter as the Edinburgh, substituting neatsfoot oil for olive oil. The proper preparation of this ointment is still a problem. Dr Duncan says the best he has ever seen was made with 12 oz. nitrous acid, 4 oz. mercury, 26½ oz. olive oil, and 15 oz. lard, mixed *while hot* in a large mortar, and assisting the operation by heat if it should not froth up.

The *vinum aloes* is that of Edinburgh, made of double the strength, to correspond with the proportions of aloes used by the other Colleges. The *vinum colchici* being made with the dry bulb, cannot be compared with the London formula, in which the fresh bulb is used. It is however a powerful remedy. The *vinum tabaci* is made with a pint, that of Edinburgh with twelve ounces of wine to the ounce. The *vinum veratri* is of the same strength with the London preparation.

In performing this analysis I have not thought it worth while to notice any of the chemicals, as the mode of preparing them does not affect the identity of the medicine, nor have I included the preparations peculiar to our Pharmacopœia.

The physician and apothecary having most reliance on the authority of the London College, will be compelled, I should think, to confess that the change from its formulæ to those of the Pharmacopœia of the United States, will not be a violent change by any means; and that the convenience of having a common standard throughout our widely extended country, far outweighs the little difficulties which custom and prejudice may fancy to result from the adoption of the National Pharmacopœia.

## REVIEW.

ARTICLE VI.—*The Edinburgh New Dispensatory, &c.*  
By Andrew Duncan, M.D. Twelfth edition. Edinburgh, 1830, pp. 1127.

[Continued from Vol. III. p. 261.]

By comparing the present, with some of the earlier editions of this work, the student will become sensible of the great improvements which have been made in pharmaceutical science within the last twenty years. And he will also find that it is from the continent, where pharmacy is sedulously taught and studied, where an entrance into the profession is only to be gained by years of scientific as well as manual application, that almost all these improvements have emanated. It is surprising with what patience, minuteness and accuracy these German and French pharmaciens pursue their researches. From the most subtle and refined chemical analysis, down to the determination of the loss which leaves and roots sustain in drying and powdering—nothing escapes them. They have determined the quantity of essential and fixed oils, of alcoholic and watery extract, furnished by a large number of the officinal plants, and there is not on record a more beautiful example of patient and skilful investigation, than their researches into the properties of the bitter almond and the white mustard seed. The most striking proof of the eminence which the profession has attained is to be found in the *Journal de Pharmacie*. That

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invaluable journal is a record of the progress of modern chemistry; and so completely are the two sciences of Chemistry and Pharmacy blended in its pages, that, if we were to abstract from the history of the former, the discoveries made by practical pharmaciens, we should at once blot out some of the noblest triumphs of modern science, and reduce the all controlling chemistry of the present day, which is rendering magnetism and electricity and light its tributaries—we should reduce this most wonderful of sciences—almost to the narrow limits which it occupied in the days of Black and Lavoisier.

It is his acquaintance with the labours of these patient investigators, that has enabled Dr Duncan to present his Dispensatory to the English public, in its present greatly improved form. He is himself, principally, a judicious and careful compiler, and has not contributed much from his own researches to enrich the science to which he has devoted himself. We were particularly struck with the passage in which he informs us that he thought he had discovered cinchonine in the columbo. Would Pelletier or Robiquet have taken so much pains to announce that they had done something which amounted to nothing?

We are sorry to perceive that the work has been printed with extreme carelessness. As examples of this, we may refer to page 654, where sulphate is printed for sulphuret; to p. 664, nitrous acid for nitric acid; p. 667, 120 parts for 124 parts of water; p. 741, muriatic acid for caustic ammonia; p. 799, protoacetate for protonitrate; p. 811, peroxide for protoxide. The references in the index are also inaccurately printed.

The work of Dr Duncan is entitled to the particular notice and respect of American pharmacutists, from the circumstance of its having been extensively circulated in our country, under the title of Dr Coxe's American Dispensatory. The learned editor, it is true, incorporated into the work many passages relating to our indigenous plants, but not more than are to be found in the edition of Dr Dyckman published in New York in 1818 under its proper title. The additions of the New

York editor display in fact far more care and labour than those of Dr Coxe. The botanical references and descriptions of the American plants which it contains are prepared after the model afforded by Dr Duncan, and are extended to nearly one hundred species.

The History of the American Dispensatory deserves to be recorded as exhibiting the early stage in the progress of pharmaceutical science in America. The first edition was published in 1806, and was almost literally a reprint of the second edition of Dr Duncan's Dispensatory. The changes were, in substituting a purely alphabetical arrangement, in omitting the treatise on chemistry, and incorporating the principal part of its matter under particular heads, and in introducing, from Dr Barton's collections, short accounts of about sixty indigenous plants.

There was nothing excepting the last mentioned circumstance, and the fact that the work was printed in Philadelphia, to entitle it to the name of an American Dispensatory. Nearly every article was left as it came from the hands of Dr Duncan, and having a particular reference to the localities of Great Britain. We were told, for example, that *bryony* was an indigenous plant; that *calamus* grows plentifully about Norwich; that the *aconite*, the *anchusa*, the *hellebore*, &c. are commonly cultivated in our gardens; that the *Rhamnus catharticus* is common in hedges; and that *tobacco* is sometimes cultivated for medicinal use in gardens, but that in general it is imported from America. Dr Duncan, as may be supposed, was much offended by this claim of authorship, and in the fourth edition of his work, speaks of Dr Coxe's book as a *reprint* of his second edition.

"With due respect to my friend Dr Duncan," says the American editor, in the advertisement to his second edition, "I must, in justice to myself, regard it as a new work, inasmuch as the arrangement differs totally from every other work of the kind hitherto published. The materials of a work of this nature must necessarily be the same in a greater or less degree



in all; and the doctor owes the celebrity of his own editions to the free use he has made of the works of others." This is to be sure a home thrust; for the first edition of Dr Duncan's Dispensatory was almost as completely Dr Lewis's, so far as regards the body of the work, as Coxe's was Duncan's. The new chemical language was indeed introduced, and this was, at that time of day, a task of delicacy and importance; rather more so, we think, than that of the mere transposition of parts. Setting aside, therefore, the relative claims of Dr Coxe to authorship, we think his positive claims to the honour almost as doubtful as those which are made at the patent office by the inventors of new churns and washing machines, and which are so pleasantly discussed and settled by the facetious editor of the Franklin Journal. That "the materials of a work of this kind must necessarily be the same in a greater or less degree in all" is indeed true. But then every author who brings forth a new compilation, is presumed to have some definite object in view, differing from those aimed at by his predecessors. He wishes to blend with former labours, some additional branch of knowledge, or he writes, as in the case of Dr Coxe, for a new locality. In either case his point of view is changed. Objects important and close at hand, in the one case, are lost in the distance, in the other, and new objects, unknown, unnoticed, or unimportant in the former, become essential to his plan in the latter. He cannot, it is true, alter facts. But there is a process of mental digestion and assimilation as essential to the proper execution of a compiled, as of an original performance. That work, be the station and the learning of its god-father what they may, does not entitle him to the name of author, which is made up with little other help than the scissars or an index.

The second edition of the American Dispensatory was published in 1810, and contained many valuable additions from the fourth Edinburgh edition. Its value was enhanced by a list of synonymes copied entirely from the Dictionary of Merchandise, published in this city in 1805. The third



edition was printed with few alterations. In the interval between that and the fourth edition, appeared Dr Thatcher's Dispensatory, a work having higher claims to originality than any American Dispensatory hitherto published. Dr Coxe did not hesitate to avail himself of Dr Thatcher's descriptions of indigenous plants, which he substituted for the short and imperfect notices of Barton. These extracts from Thatcher have contributed more to the value of the work than all the other additions which the editor has made. They gave it in some degree what it did not before possess, an American character. Being incorporated with the valuable matter of the Edinburgh Dispensatory, the whole work was of a more useful and practical character than that of Thatcher's, who thus furnished his rival with the means of superseding him in public estimation. Even-handed justice, we think, would have ordered it otherwise, and secured to Dr Thatcher, the reputation and the profit to which he was fairly entitled by this portion of his Dispensatory.

The subsequent editions of Dr Coxe's work were enlarged with copious extracts from Paris's Pharmacologia, and from that farrago of *unauthenticated matter*—Gray's Supplement to the Pharmacopœia. Upon a few articles, such as cinchona, jalap, opium, cyanogen, and some others, he has abandoned his original text, and borrowed copiously from other sources, or added new matter of his own. The main body of his Dispensatory, however, retains its original form. It has not even been deemed necessary to accommodate the text to the changes which have been made by the British colleges. For example, preparations are given in the ninth and last edition as officinal, which have long been rejected by the colleges. The glass, and the cerated glass of antimony, are both inserted as officinal preparations of the Edinburgh Pharmacopœia, although no longer to be found there. The absurd direction for making the cerated glass is also retained, although, if the author had consulted the French Pharmacopœias, he would have discovered its incorrectness.

This edition has also been prepared without making any use of the twelfth edition of Dr Duncan, which was printed in 1830, or of the latest revision of the Dublin Pharmacopœia, which is now the most accurate and scientific of the British authorities.

The most singular feature of the ninth edition of the American Dispensatory—the object we suspect for which it was hurried before the public, is, the annotations upon the Pharmacopœia of 1830; or as he styles the rival revisions, the New York and Philadelphia Pharmacopœias. The appearance of these works has reconciled our author to the Pharmacopœia of 1820, in the condemnation of which he was formerly loud; but which he now appears willing to regard as an authoritative standard. He condemns, of course, both revisions—“yet likes the worst the best.” We have carefully examined these notes, and are compelled to pronounce the censures which he bestows upon the revision of the Washington convention, to be trivial and puerile. He does not detect a single incorrect statement or false formula in it; while he points out several of those in the New York edition. He lavishes notes of admiration upon changes trifling in themselves, yet growing out of the adoption of a more symmetrical arrangement and correct nomenclature; and in many instances where he censures the convention for deviating from the British colleges, it has in fact followed them. We shall take a future occasion to examine the unfairness of these criticisms at greater length than is now in our power. In the mean time, we may enter our caveat against the rebuke of the learned professor, for the severity of criticism bestowed upon the New York Pharmacopœia. Our sentence, we believe, has been confirmed by the public. We are not conscious of having set down any thing in malice. Just criticism is forced at times to be severe and harsh, as we may seem to have been upon that and upon the present occasion; yet we have in both instances restrained and not given way to our feelings. The private worth, the learning and high respectability of Dr Coxe are univer-

sally acknowledged; but representing, as we do, the interests of the pharmaceutic profession, we have felt ourselves bound to seize the first occasion that has presented itself, of examining the claims of the American Dispensatory to the character of an original work. Those claims we honestly think cannot be sustained at the bar of just criticism. The improved state of pharmacy in this country, the zeal with which it is studied, the talent which is becoming embarked in its pursuits, imperiously demand a work of a higher order. The time, we trust, is not distant when that call will be answered.

## SELECTED ARTICLES.

ARTICLE VII.—*On the Action of Sulphurous Acid on Hydriodic Acid, either in a free or combined state. By M. Saladin.*

IN most treatises on chemistry, it is asserted that sulphurous acid exerted no action on hydriodic acid and the hydriodates. Whilst endeavouring, a short time since, to ascertain the cause of the marked yellow colour which is communicated by the sulphuric ether of commerce to a solution of hydriodate of lime, I was led to some results, which appear to me to controvert this assertion.

If a few drops of hydriodic acid, or of a solution of any of the hydriodates, be poured on some liquid sulphurous acid, entirely free from nitrous or sulphuric acids, and made by the combustion of purified sulphur, a yellow colour is instantly developed, the intensity of which is in proportion to the degree of the concentration of the acids; the action of the air, of heat, or of an alkali, causes its rapid disappearance.

I at first attributed this to the presence of iodic acid, or an iodate in the compounds made use of, but having in vain endeavoured to detect them by the nitrates of silver, barytes and lead, hydro-sulphuric acid, pure alcohol, prolonged calcination, &c. and hydriodic acids, prepared from the protoioduret of phosphorus, having presented the same phenomena, it was no longer to be doubted that they were acted on by sulphurous acid.

If rectified sulphuric ether be agitated with the fluid thus coloured, it also acquires, in a short time, a similar tint, though less intense; it is, however, much darker when an ether charged with sulphurous acid is added to a hydriodate.

If the mixture of sulphurous acid, and the acid or alkaline solution, be exposed to the air, the upper stratum rapidly loses its colour, and this change is gradually extended to the whole of the fluid. This phenomenon is owing as well to the volatilization of a part of the iodine (shown by the tinging of the paper used to cover the test glass), as to the transformation of the other into hydriodic acid, arising from the reaction of the sulphurous acid on this simple body.

On adding an additional quantity of sulphurous acid, the fluid regains the yellow colour it had lost, though this tint is lighter on each repetition of the process, and at last it becomes turbid, deposits sulphur, and all the hydriodate it contains is gradually replaced by an acid sulphate. It is unnecessary to add, that the action of the acid is sensible in proportion to its strength, that the quantity of iodine, even where the acid is powerful, is very small, and always requires twice its volume of acid gas.

The mixture of a hydriodate with sulphurous acid, subjected to distillation, at first rapidly loses its colour; as the excess of this latter passes off, a small quantity of hydriodic acid is then disengaged; the fluid in the retort becomes more and more coloured, and contains a portion of the salt employed, mixed with iodine, a sulphate and sulphur.

It may not be superfluous to remark, that among the reagents capable of showing the presence of the simple or the ioduretted hydriodic acid, the nitrate of silver is to be preferred, from the complete insolubility of its ioduret, to the subacetate of lead, or the salts of the protoxide or deutoxide of mercury. The solubility of the ioduret of lead is well ascertained, and the proto and deuto-iodurets of mercury, partaking of this property, do not deserve the epithet of insoluble. I will not speak of the first, which is only soluble in 2375 parts of water; but the latter



being much more soluble, appears to merit some attention: it in fact dissolves, when pure and freed from an excess of hydriodate or mercurial salts, not only in ether and alcohol, but also in water, the medium of its solubility appears to me to be, in ether  $\frac{1.3}{1000}$  or  $0.01\frac{1}{9}$ ; in rectified alcohol  $\frac{2.7}{1000}$  or  $00.2\frac{5}{8}$ ; in distilled water  $\frac{3.9}{1000}$  or  $00.3\frac{9}{10}$ . When permitted to evaporate slowly and spontaneously, its aqueous solution deposits some reddish points, mixed with microscopic crystals.—*Journal de Chimie Medicale*, Sept. 1831.

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ARTICLE VIII.—*Notes on Narcotine.* By M. Robiquet.

Narcotine has been the subject of much controversy, for, after having been considered by Derosnes as a principle *sui generis*, Sertuerner viewed it as merely a salt of morphine; some physiologists have regarded it as so powerful a narcotic, that they have thought it worthy of forming the type of this class of remedies; others, on the contrary, are of opinion that it is wholly inert. MM. Dumas and Pelletier have found that it contains 7.21 per cent of nitrogen; Liebig has recently stated that it only contained 2.51. To all these contradictory views I am about to add some others, which contribute not a little to embarrass the subject, and to demonstrate, that, as regards organic substances, we must consider them often, before we attempt to decide on their nature.

Hitherto narcotine has been regarded as wholly incapable of saturating the acids, although, from the first, its faculty of dissolving in them was admitted; but a particular circumstance having induced me to examine this more closely, I am now of opinion, that it is capable of saturating these bodies, and of combining with them as fully as a majority of the organic alkalies.

For a long time past, I have been occupied with the preparation of morphine, and I have paid great attention to the choice of the best qualities of opium, and have not had recourse to any other plan than that of macerations in cold water without the addition of any acid; nevertheless it was pointed out to me, a short time since, that my morphine contained a notable proportion of narcotine, which I was far from suspecting, after the precautions I had taken. I supposed, at first, that the presence of the narcotine was owing to the treatment of the opium having been divided, and that the last portions would contain all the narcotine which should have been diffused through the entire product. I therefore ordered that no morphine should be delivered until the whole treatment was finished, and the different products well mixed together. This time 100 lbs. of opium had been operated on, and nevertheless the narcotine was still found in the same relative proportion; thus proving that the narcotine which I supposed to remain in the greatest quantity in the marc, was almost wholly taken up in the cold aqueous macerations. Having also found that the best qualities of opium were not always the richest in morphine, I decided on ~~never~~ purchasing any of that drug without subjecting it to a trial.

The great solubility of narcotine in the aqueous menstruum, being only reasonably attributable to the superabundant acid of the opium, I was naturally led to again investigate the degree of this solubility, and was not a little surprised to find that narcotine, precipitated from these infusions by means of ammonia, and purified with alcohol, so completely saturated the sulphuric and muriatic acids, as to destroy their acid taste, though not their property of acting on test papers. Moreover, the combinations which resulted, were capable of crystallizing like true salts, and remained unalterable when exposed to the action of the air. This result is particularly remarkable in the hydrochlorate.

I endeavoured to determine the proportions of these combinations, and for this purpose exactly weighed out one gramme of concentrated sulphuric acid; diluted it with a certain quan-

tity of water, subjected it to a slight heat, and added very pure, well dried and pulverized narcotine, until the acid was saturated. This required eight grammes, which is remarkable, as the proportion of one to eight is precisely that indicated by MM. Dumas and Pelletier for the sulphate of morphine. In fact, according to those chemists, 100 of morphine will saturate 12.465 of sulphuric acid; now the quotient of 100 by 8 is 12.50.

I was also desirous of ascertaining the proportion of hydrochloric acid necessary to saturate a determined quantity of narcotine; and to attain this with certainty, I had recourse to the method employed by M. Liebig, which consists in placing a given weight of the organic alkali in contact with dry hydrochloric gas, then driving off the excess of gas by a current of carbonic acid gas and weighing the residuum; but I found it impossible by this means to get rid of the excess of acid; I acted on ten grammes of narcotine, and the mass had absorbed hydrochloric gas, which could not be disengaged from it either by carbonic acid gas or heat. However, I remarked that the combination of the acid and the narcotine took place with disengagement of heat, as was observed by M. Liebig with organic bases.

Acetic acid acts in a very different manner on narcotine. This acid when cold and at 7° of concentration, dissolves it very well, and in so large a quantity, as to give the fluid a syrupy consistence; but if it be heated, the narcotine precipitates on the first action of the heat, and long before the acid is volatilized. This is not the case with morphine, as its combination with acetic acid is not destroyed even when evaporated to dryness, hence this is a mode to which daily recourse is had, to separate these two bodies.

By no means the same effect takes place with the sulphuric and muriatic acids; their combination with narcotine is not in the least disturbed by the heat of a water bath, or even by evaporation to dryness. These solutions, when acted on by heat, preserve their transparency and assume greater consistence, thickening like a concentrated solution of gum, and finally become

completely dry; the product is redissolved in water without leaving the slightest residue. Hence, they are very permanent combinations; but whether they are analogous to the same combinations of the common organic alkalies, the actual state of our knowledge does not permit us to decide, as from the last observations of M. Liebig, we remain in uncertainty as to the true composition of narcotine, for the differences are so great, and they are so completely beyond the limits of possible errors in chemists of such abilities as those who have treated on this subject, that I am persuaded that they could not have operated on the same body.

It is doubtless recollected, for this question is often discussed, that struck with the presence of ammonia in those vegetables which furnish organic bases, and with that of nitrogen in these same bases, that strengthened moreover by the necessity of having recourse to alkalies and often to acids to extract these organic bases, I maintained that they did not pre-exist in the vegetables, and that, founding my opinion on the capacity of saturation of morphine, I was of opinion that their alkalinity was owing to the presence of ammonia. This opinion was ably combated by MM. Pelletier and Dumas, who demonstrated that among the organic bases, it was not those which contained the most nitrogen which possessed the greatest capacity of saturation. I replied to this, that it might happen that a substance primarily azotic would combine, in consequence of the chemical reactions made use of to extract the organic bases, with a certain dose of ammonia, and that then the capacity of saturation would no longer be found in relation to the nitrogen. This opinion was not adopted, and that of MM. Pelletier and Dumas prevailed. At the present time M. Liebig puts the whole in doubt, and gives as the constant result of his new researches, "that in comparing the quantity of acid which neutralizes a certain quantity of a vegetable base, it is found that each atom of acid combines with a certain quantity of the base which contains exactly two atoms of nitrogen." This relation which exists between the acid and



the nitrogen has induced M. Liebig to say, "that it would appear. that the alkaline properties of these bodies may be essentially dependent on the presence of the nitrogen they are supposed to contain, whether in the form of ammonia, or in that of some other unknown combination." M. Liebig gives more weight to this latter opinion, in dwelling on the manner in which the nitric acid acts, which destroys all these organic bases, without combining with the ammonia, which could not fail to take place, according to him, if these bases contained it in a primary state. I will not now examine how far this opinion is exempt from objections, but it so closely approaches my own, that I cannot help feeling some satisfaction in having always persisted in a belief that the organic bases do not pre-exist in the plants, and that their alkalinity is owing to an eventual combination with nitrogen. However, we approach the limits of this discussion, and the new researches which have excited the present differences of opinion, will, I hope, tend to raise the remainder of the veil which disguises the truth we are all anxious to discover.

I cannot terminate this short notice without stating, that, struck with the excessive bitterness of the salts of narcotine, I have not been persuaded, notwithstanding the observations of M. Lebailly, that this substance has no action on the animal economy, and I have begged one of our colleagues to make some experiments on this subject, to which he has kindly consented. As soon as the results are communicated to me, I will hasten to lay them before the society.—*Journal de Pharmacie, November 1831.*



ARTICLE IX.—*On Aloes, Catechu, Kino and Opium.*  
By M. Guibourt.

I am indebted to the friendly and active correspondence of Mr Pereira, Professor of Materia Medica and Pharmacy in London, for a great number of new substances and observations well worthy of the attention of the Society of Pharmacy.

*Aloes.* Three kinds of aloes have always been recognised in France, the *socotorine*, *hepatic* and *caballine*, but these names have been applied to very different species at different times, observing, however, the first has always been applied to the best kind then in the market, that of hepatic to the next quality, and caballine to the inferior kinds. Thus, the aloes from Socotora, which ought to be the true Socotorine aloes, having disappeared from commerce, the name of Socotorine aloes was transferred to aloes from the Cape of Good Hope; that of hepatic aloes was given to the aloes from Barbadoes; and finally, we have successively seen two inferior kinds, but differing widely from each other, bear the name of caballine aloes.

To enable me to remove this confusion, Mr Pereira has been kind enough to send me specimens of the true socotorine and hepatic aloes. I will endeavour to describe them, though, to tell the truth, it is difficult to point out the shades of smell and colour which distinguish the different kinds of the same product.

1. *True Socotorine Aloes*, PEREIRA. Ainslie, in his *Materia Medica*, Vol. I. p. 9, characterises this aloes very well in saying that it is of a reddish brown, shining, as if varnished, of an aromatic agreeable odour. Duncan, in the *New Edinburgh Dispensatory*, describes it in nearly the same terms: surface shining and clear and somewhat pellucid; colour yellowish red with a purple reflection; odour not disagreeable, somewhat resembling that of myrrh. When cold it is hard.

and friable; but it readily reunites in a single mass, and softens under the fingers like wax. If it be divided and dried in the air, it is readily pulverisable, and its powder is of a brilliant golden yellow. To these characters I may add that this aloes is of a much lighter colour than that from the Cape of Good Hope, and also that it is translucent, when in mass, when opposed to the light, whilst the African kind is only transparent in thin laminæ; the latter is of a brown black, appearing greenish in mass, red when divided into small conchoidal plates, whilst the former is reddish in mass and light coloured when it is divided. The smell also is wholly different; the socotorine, in mass, has a mild and agreeable odour; that from the cape has a strong odour which, for a long time, we have been accustomed to consider as the type of the smell of aloes.

Besides the above described aloes, Mr Pereira previously sent me a specimen which is only translucent, instead of being transparent; which loses its lustre on exposure, and is less friable.

2. *Real Hepatic Aloes.* This aloes is opaque and of a liver colour; it assumes a rounded form on melting, like pitch, although it appears very hard. It is difficult to break; in smell it resembles the socotorine.

These two aloes are brought from Bombay to England, packed in buffalo skins. According to a London druggist, the socotorine may even be found forming a sort of vein in the midst of a mass of hepatic aloes: the analogous smell of these two aloes might in fact lead to the supposition that they were derived from the same plant; nevertheless the other characters of the first described socotorine and the hepatic, differ so much that I can scarcely believe that they can be the product of the same operation.

Although this aloes is brought from Bombay, it must not be supposed that it is not better entitled to the name of socotorine aloes than that from the Cape of Good Hope. Ainslie leaves us no doubt on this subject. He informs us that in India, they prepare from the *Aloe perfoliata*, only an inferior

kind of aloes, named *mozambrun*, and that those which are most used there, come from the Cape of Good Hope and the eastern parts of Africa (Cape Aloes), or from the island of Socotora (socotorine aloes), or from Yemen in Arabia (hepatic aloes). According to him, this last is probably obtained from the *Aloe perfoliata*, whilst the socotorine, and even the Cape aloes, is procured from the *Aloe spicata*. If reference was had only to the smell of these products, I should rather attribute the hepatic and socotorine to one plant and the Cape aloes to another.

I will not here revert to the description of the Cape and Barbadoes aloes, as they are well known; as to the *caballine*, I have two very different kinds, of the origin of which I am not certain, therefore this is not the time to speak of it.

*Catechu.* All authors on materia medica, as Ainslie, Duncan, Fee, myself, and even Thenard in his Treatise on Chemistry, have cited the analysis of Davy of two kinds of catechu, which he terms Bengal catechu, and Bombay catechu; but as I remarked that Thenard has attributed a lighter colour to the latter, whilst Duncan and Ainslie assert the contrary, to clear up my doubts on the subject, I sent to Mr Pereira all the kinds of catechu that I possessed, begging him to inform me which of them was called Bengal or Bombay catechu in England: his reply was as follows:

“I am obliged to state to you that these terms are wholly unknown to our druggists and Indian traders. No catechu is brought here from Bombay, and consequently there is in reality no such article as Bombay catechu; whilst the term Bengal is applicable to every kind, as all that we receive comes by way of Bengal. It is curious that there are no terms in commerce to distinguish the different species of catechu; this subject is still involved in much obscurity. After having attentively read Davy’s memoir, I am of opinion that the name Bombay catechu employed by him, refers to a blackish kind of catechu.”

In transmitting to Mr Pereira my different kinds of catechu,



I also wished to procure the best sorts, which have been entirely wanting in Paris for many years past. Unfortunately it appears that they are also very rare in England, so that they are obliged to use the common catechu of commerce, which contains 25 per cent of sand, and is perhaps the worst that ever existed. Mr Pereira, on his part, wished to ascertain whether a catechu in small cubic pieces, which I described as adulterated with starch, was the same as a cubical, dull, light catechu, much esteemed in England; by the reciprocal interchange of specimens, we convinced ourselves that these two catechus were entirely different. The final result of these exchanges was, that I now recognize nine kinds of catechu, viz.

1. *Dull and reddish Catechu in balls.* In rounded pieces of three or four ounces in weight, having a marbled and undulated fracture, and presenting on the lower surface a great number of specks, which appeared to me to be rice chaff. See *Histoire Abrégée des Drogues Simples*, No. 761. I have always considered this as the best, at least it is one of the best. It is now wanting in commerce, and is the kind designated by Antoine Jussieu as catechu in balls. See *Memoires de l'Academie*, 1720, or *Le Dictionnaire des Drogues de Lemery*, p. 208.

2. *Flat and orbicular brown Catechu.* Very hard, heavy, of a dark brown, fracture shining. It has also disappeared from commerce. (*Hist. des Drogues*, No. 762. *Cachou en masses aplaties.* Lemery, p. 208.)

3. *Pure Catechu in mass.* (*Hist. des Drog.* No. 763.) Of a uniform dark yellowish brown, smooth conchoidal fracture, wrapped in large leaves, very much reticulated. This catechu appeared in commerce about fifteen years since, and was bought up for the central pharmacy of the hospitals; I have not since met with it. It is evidently of a superior quality.

4. *Cubic dull Catechu.* In pieces of two inches square, and one inch in thickness; it is very clean externally, and not studded with rice chaff. Internally, the best pieces are analogous to No. 1, but in general, they are duller and more grey,

and formed of parallel layers like slate, readily separating into two or three fragments in the direction of the layers. They then form flat pieces, blackish on one side and greyish on the other, somewhat resembling the bark of a tree. This is what is meant by A. de Jussieu, where he says, that catechu was sometimes in the shape of the bark of a tree. This catechu contains starch, which remains insoluble, combined to a portion of tannin, when it is heated by cold water. Some years ago I saw a large quantity of it in the possession of a druggist in Paris.

5. *Whitish Catechu.* This catechu was sent from India to Mr Pereira, under the name of *katha suffaid*, and Dr Wallich informed him that *saffaed* or *suffaed* meant white or pale. This catechu is black on the exterior, hard and heavy, so that it might be taken at first sight for a blackish stone, but internally it is almost white, and without lustre. It appears to have been in the form of small loaves, or flat and rounded lozenges, of about an inch in diameter; but very often this form is altered during the desiccation, in a greater or less degree. This catechu has a very bitter, astringent taste, somewhat saccharine, and leaving a taste of smoke in the mouth. This latter circumstance leads me to think that its external black colour is owing to its having been dried by smoke.

6. *Amylaceous Catechu in small cubes*, described in the *Hist. des Drogues*, No. 764. Previously examined by M. Planche, Journ. de Pharm. I. page 212. Both M. Planche and myself thought that this catechu was a fraudulent product, manufactured in Europe; but it is possible that it may come from India, where, on the authority of Gracias, it is said that it is customary to add some kind of flour to the catechu, to facilitate the fabrication of it.

7. *Cubic resinous Catechu.* From the want of a more appropriate name, I thus designate a species of catechu, which was sent to me by Mr Pereira, to ascertain whether it was the same kind as that which I had described as *adulterated catechu*, expressing his astonishment that I should speak thus of an ar-



ticle so highly esteemed in England; these two catechus, however, are very different.

This is in pieces about an inch square. It is very light, as if porous, of a dull and uniform orange red internally, and of a darker shade on the exterior. It wholly dissolves in the mouth, is very astringent; but does not leave a sweet taste. It is almost entirely soluble in cold water, and the residuum contains, instead of starch, a resin fusible in boiling water, and soluble in alcohol, hence I have given it the name of resinous catechu.

8. *Silicious brown Catechu*. I cannot otherwise designate the common catechu of commerce, which appears to me to be a fraudulent product, intended to imitate and replace No. 2. This catechu is in square, rounded, globular, or flattened pieces, of a considerable size, often weighing near a pound; it is a uniform dark brown colour, has a compact, somewhat shining fracture, and in a strong light presents many brilliant points, from the admixture of silicious particles. It is very hard and heavy, and gives a residuum of 26 per cent of earthy matters on calcination. This kind of catechu more particularly is known in London by the name of *tena japonica*.

9. *Black and mucilaginous Catechu*. This is in pieces of 18 lines square, by an inch in thickness. Externally, it is similar to No. 4; but internally, it is quite black and shining; it has a mucilaginous taste, and is feebly astringent.

At first sight it may appear strange that so many kinds of catechu should exist, but it is readily explainable, when we take into consideration the great number of countries that furnish it, the different modes in which it may be prepared, and the national habit which induces the people of every country to give a special form to the products of their industry which distinguish them from those of other nations. Hence, notwithstanding the assurance given to Mr Pereira by the East Indian traders, we cannot avoid believing that there exists a species of catechu brought from Bombay or Goa, and which is different from that derived from Bengal: for Gracías states

that the tree named caté (*acacia catechu*) is especially found in the peninsula of Cambay, at Goa, and in the surrounding country; and Ainslie says, that two kinds of catechu are exported from India to Europe, the one pale, coming from the province of Canara by way of Bengal, the other of a yellowish brown, coming from Behar, by way of Bombay; moreover, according to the account of Colonel Kirkpatrick, a third sort is derived from Nepaul; finally, Ainslie states, that in the Bazzars of Maritime India, two other substances, resembling catechu, are to be met with, which are used by the European and native physicians. These two substances are the *cutta camboo* and the *cashcuttie*, prepared in the kingdoms of Pegu and Assam, and in the Mysore, from the seeds of the *Areca catechu*.

It is therefore certain, that several kinds of catechu exist; but to particularise, among those which we possess, those which come from Nepaul, Bengal, Pegu, Bombay, &c. and which are the product of the *Acacia catechu* or of the *Areca*, is at present impossible.

*Kino.* Several kinds of kino are found in commerce, and authors mention several trees of very different families and from various countries, which are said to produce this article; but until travellers bring us juices or extracts obtained from these trees, identical with those of commerce, we shall be obliged to remain in uncertainty on the origin of these latter, and in many cases to substitute new opinions for those we formerly promulgated, and perhaps be also forced to abandon these.

I described, in the *Histoire des Drogues Simples*, two principal kinds of kino; one (No. 766) in irregular masses, broken into fragments of one to three drachms in weight; some pieces presented rectangular impressions resembling those which might be produced by straw matting. I have said that it was completely opaque, which is generally the case; but I have since met with it of a superior quality, with a vitreous frac-

ture, and transparent when in laminæ, especially when examined with a microscope. This is the same kino as that described by Murray (Apparatus vi. p. 203), and regarded by him as the *astringent gutta Gambia* of Fothergill, which appears to be produced by the *Pterocarpus erinaceus*, Lam. It is also the third variety of Duncan, attributed by him to the *Eucalyptus resinifera* of New Holland; I myself was of opinion, on the authority of M. Virey, that it is derived from the *Nauclea Gambeer* of the Sunda islands (*Uncaria Gambeer*, Rox.). Mr Pereira now tells me that one of his friends, who was a physician in Jamaica, found that this kino was prepared in that island from the *Coccoloba uvifera*.

The second kind of kino (No. 767) is in very small fragments, of a brilliant black colour, transparent, and of a ruby red when they are reduced into thin laminæ. Every fragment of any size presents on one of its faces parallel grooves, which I attribute to the form of the vase in which it was dried in thin layers. This kino would be the second variety of Duncan, if this learned pharmacologist had not attributed to the latter a considerably bitter and astringent taste, whilst that of mine is purely astringent. Be this as it may, on his authority I have attributed this substance to the *Coccoloba uvifera* of America, remarking, however, that the grains of pepper which I have found in it, might induce a belief that it came from Asia. Dr Duncan himself states that the kino which is imported into England by the East India company, resembles this kind in many particulars. Mr Pereira now tells me, that in fact this kino is brought by the East India Company; that it is very common in England, where it bears the name of *Amboyna* or *East Indian Kino*; and finally, that it is generally supposed that it is extracted from the leaves of the *Uncaria gambeer*.

I have spoken in the *Histoire des Drogues*, No. 768, of some other kinds of kino which I regarded as varieties or alterations of the two preceding. This is true, as regards the kind B, which presents the grooves of the last mentioned species, and evidently belongs to the same manufacture; but I think



that the kind A, which is recognisable by its dull brown colour, approaching to that of the liver, and its complete opacity, is different from No. 766. This *dull brown* kino, moreover, appears to have been divided into masses of about 15 to 18 lines square, all the faces of which are smooth and destitute of any marks; it therefore belongs to another manufacture, and probably comes from another country, for, as regards foreign drugs, a difference of form almost always indicates one in the country which produces them.

I have also spoken of a kino C, which I believe was a fraudulent product, because, through the astringent, acid, and bitter taste, I thought I could always distinguish that of liquorice; but it is also possible that this article may be natural. This kino, moreover, is distinguished from the others by its powder, which is of a dark brown red, with a *violaceous* tint.

Under No. 769, I described the juice of the *Eucalyptus resinifera*, as it was brought from New Holland by M. Lesson. The characters I assigned to it agreed very well with those of the juice of the *Eucalyptus*; but it should be noticed, that they referred to the pure article, and that a sophisticated product may exist, even among those just described, which equally belongs to this Australian tree.

*New kind of Kino.* This variety is new to me, but it is possible that it may be the oldest of all; in short, that it may be the true *astringent gutta Gambia*. It was sent to me by Mr Pereira with the following observations:

“I have received a specimen, of which I send you a portion; it was obtained from a wholesale druggist, in whose possession it had been for ten years; it is evidently in *tears*. I would say that it came from Africa; it was imported in large packages.”

This substance is in small fragments, in the form of drops or elongated tears, which have exuded through the bark of a tree and dried there. In mass it appears black, but is transparent, and of a deep ruby red when it is held between the eye and the light. Almost all the fragments present on one of their sides fragments of the grey bark from which they have

been detached. On the side which had been exposed to the air, they are wrinkled, and as if grooved, to such a degree, that I have asked myself, if it was not this natural form which it had been attempted to imitate in the fabrication of the East Indian kino.

This substance has a very astringent taste; placed in cold water, it swells, and slowly and feebly tinges the fluid of a red colour. If it be examined in this swelled state, it will be seen that it is very unequally coloured, even in the same fragment; several pieces, either naturally pale, or deprived of their colour by the water, have the appearance of an insoluble, tenacious and elastic gum. As to the others, they appear to be a combination of the same gum with the red colouring principle, which has become insoluble from its oxygenation by the air; at least, it may be remarked that the outer portion of the fragments of the gum resists the action of the water much more than the interior, and remains in the form of tenacious membranes. Boiling water dissolves much more, and forms a deep red fluid which becomes very turbid on cooling; but a large proportion of the membranous substance always resists its action. It results from the above, that this kino is produced by the unequal mixture of a gummy juice and one of a red astringent character, which simultaneously flow from the same plant.

As to the question, whether this astringent gum is the same as that formerly described by Fothergill, it is extremely difficult to decide, on account of the confusion which exists in the letter in which this practitioner has described the *gutta Gambiæ*. It is as follows: "The new astringent gum discovered in Africa is thick and fragile, of a red colour approaching to black, and, moreover, is very opaque. If, however, it be broken into small fragments, it appears of a transparent red colour. It has no smell; as soon as it is put in the mouth, it is found to be very astringent, though agreeable, and the greater portion rapidly dissolves. When it is placed in water, six-sevenths rapidly dissolve and colour it of a deep red. This gum differs from that of Senegal in being much more frangible; from dra-



gon's blood in being soluble in water, and from both, by its remarkable astringency; except for these differences, it might be mistaken for dragon's blood."

At the end of this description, Fothergill transcribes, as referring to the same substance, the following extract from the instructions given to Moore then an agent at Bruscow on the river Gambia. "There is a red liquid which flows abundantly from a tree named *pau de sangue*, and which thickens into a gum, which is very valuable; you will use every exertion to procure some of it." In reply to these instructions, Moore sent from Bruscow a gum which was supposed to be the true gum tragacanth. He took great pains to gather it; but, from 10 or 12 lbs., only two of true gum tragacanth were obtained, the remainder was only gum Senegal, of an inferior quality.

Such is Fothergill's letter; the description with which it commences is precise, and is applicable only to the substance under consideration; but we afterwards find that this gum was attributed to a tree named *pau de sangue*. Moore, who was requested to send it, transmitted as its product, a gum which was taken for the true gum tragacanth. Thus, three hypotheses present themselves; either the substance described by Fothergill was erroneously attributed to the *pau de sangue*; or Moore was deceived by the persons charged to collect the gum of that tree; or finally, the gum of Fothergill was a juice artificially extracted and dried, and that of Moore, a gum naturally exuding from the same tree, which is very possible. Hence the substance sent by Mr Pereira, which is a mixture of an astringent red juice and an insoluble gum, analogous to gum tragacanth, might also be furnished by the same plant, but this is merely conjecture.

*Opium.* Three kinds of opium are found in commerce at Paris, which are termed Smyrna, Constantinople and Egyptian. Being desirous of possessing East Indian opium, I re-

quested Mr Pereira to send me some, which he was kind enough to do.

1. *Smyrna Opium*. In larger or smaller masses, often deformed and flattened, from its original softness, covered on its surface with seeds analogous to those of *Rumex*, blackening and drying on exposure to the air, of a strong virous smell. This opium is justly held in high estimation; but it should be observed, that it is liable to be adulterated with a kind of opium, in *hard balls* or rounded pieces, of an inferior quality.

2. *Constantinople Opium*. Opium in small, flat, tolerably regular pieces, of a lenticular form, from two inches to two inches and a half in diameter, always covered with a poppy leaf, whose middle nervure generally marks the middle of the piece. Smell similar to the preceding, but not so strong; it blackens and dries on exposure to the air. Some persons say, that this opium is nothing more than Smyrna opium which has been remanufactured at Constantinople, and often mixed with gum which lowers its quality.

3. *Egyptian Opium*. In round, flat pieces, larger than the preceding, of a tolerably regular form, clean surface, and appearing to have been covered by a leaf of which nothing but the vestiges remain. This opium is distinguished from the preceding by its reddish colour analogous to that of hepatic aloes, by a weaker odour, and from softening in the air, instead of drying; it has also a shining surface and is somewhat adhesive to the fingers.

I have endeavoured to ascertain the relative value of these opiums, with the following results. Four ounces of each, well selected, were treated with three pounds of very hot water, at two operations. I obtained from each two ounces three drachms and a half, of a solid, friable extract. This extract was redissolved in cold water, filtered and precipitated by ammonia. I obtained, of impure morphine, from the

Smyrna opium,	7 drachms 40 grains,
Egyptian opium,	4 drachms 40 grains,
Constantinople opium,	3 drachms 55 grains.

Although these precipitates are far from being pure morphine, it nevertheless appears to me, that they may be considered as an approximative calculation of the comparative richness of the different kinds in morphine. Moreover, I again experimented on fresh quantities, redissolved the three extracts in cold water, as in the first case; but instead of immediately precipitating by ammonia, I almost saturated the solutions with common salt, which precipitated a glutinous colouring matter. The filtered fluids, precipitated by ammonia, furnished a less impure morphine than the preceding:

Smyrna opium,	7 drachms 18 grains,
Egyptian opium,	5 drachms 20 grains,
Constantinople opium,	3 drachms 55 grains.

4. *East Indian Opium.* On account of the ties which unite England with the East Indies, I imagined that the opium of the latter countries was common in London; Mr Pereira gave me the following information:

“You suppose, and very naturally, that the opium from the East Indies is imported into England; it is, however, very rare, and none has been imported here, as an object of commerce, for many years. For a long time past, I have been unable to procure any of it; but two years since, one of my pupils, now surgeon in an East Indiaman, sent me a specimen from Bombay. I transmit you a portion, regretting that I am unable to send more. One of my friends, who had been many years in India, told me that they recognise three kinds of opium there, viz. Patna, Malwa and Benares. He also stated to me, that the kind I send you is Malwa; but that of Patna is regarded as the best.”

The East Indian opium, according to this specimen, appears to be formed of nearly uniform, elongated, flattened masses, not weighing more than an ounce. The exterior is clean, without any leaves or seeds; the interior is of a blackish brown, tolerably soft, having the lustre of an extract; the taste is pungent, *very bitter*, and leaving a nauseous taste; it has a smell of smoke, and is somewhat virous, but very different from that

of the Levant. This odour appears to me to indicate that it has been exposed to heat, a procedure which is, I believe, generally made use of in India.

Forty-two grains of this opium, treated with cold water, produced twenty-four grains of dry extract (two ounces two drachms and twenty grains, to four ounces of opium). The residue had neither the virous odour, nor the glutinous consistence of the Levant, which confirms my opinion that this opium must have been subjected to heat; but the extract had precisely the smell of that of common opium.

This extract redissolved in cold water, filtered and treated by ammonia, gave only three grains and a half of impure morphine, which corresponds to two drachms two scruples, to four ounces of opium. This result agrees with that of Dr Thomson, cited by Ainslie, that Turkey (Smyrna) opium, contains three times as much morphine as that from India. It is not therefore astonishing, that the latter is not imported into England.—*Journal de Pharmacie, December 1831.*

#### ARTICLE X.—*Theory of the Formation of Sulphuric Acid.*

The crystals which result from the action of the vapour of hypo-nitric acid and sulphurous acid are formed according to the recent experiments of M. Gaultier de Claubray:

Sulphuric acid	$\ddot{S}$ 5 atoms	64.08
Nitrous acid	$\ddot{N}$ 2 atoms	24.42
Water	$\dot{H}$ 4 atoms	11.50

100.

In the formation of sulphuric acid, the sulphurous acid completely decomposes a portion of the hypo-nitric acid, disengages the azoté, and is transformed into sulphuric acid, which



reunites to the nitrous acid and a portion of water to form the crystalline compound. When this is decomposed by an excess of water, the sulphuric acid dissolves and disengages itself from the deutoxide of azote and the hypo-nitric acid.

To analyse this crystalline compound, already examined by W. Henry, M. de Claubray pursued another plan, which, after many failures, led him to results very analogous to those indicated by theory. He first obtained a certain quantity of the crystals by passing the sulphurous gas into a vessel containing hypo-nitric acid kept at a temperature of  $20^{\circ}$ ; on adding a little water and reducing the temperature to  $0^{\circ}$ , the crystals were abundantly formed; these were washed with hypo-nitric acid, and the excess of this last driven off at a temperature of from  $21^{\circ}$  to  $30^{\circ}$ , by means of a current of air perfectly dried. This combination is white, crystalline, and so rapidly attracts moisture from the air giving out rutilant fumes, that the least portion of aqueous fluid absorbed by these crystals is rendered sensible by the disengagement of red fumes; showing that they only contain a determinate quantity of water. When they are exposed to the air, they are transformed into an oleaginous liquid which contains sulphuric acid and a certain proportion of nitric and hypo-nitric acids.

The appreciation of the quantity of sulphuric acid was made in the usual way, but that of the water and nitrous acid was affected in a novel manner. Thus he got rid of the water, by mixing the crystals with pure magnesia, and passing a current of very dry oxygen over this mixture, heated to redness, taking care that the vapour should come in contact with copper at a high temperature before reaching the chloride of calcium.

As regarded the nitrous acid, he appreciated it by an equivalent, as follows:—a known weight of the crystals were placed in the bottom of a closed tube, and covered with a stratum of deutoxide of barium (ten times the weight of the crystals) free from any foreign body, a certain quantity of water was poured on it, which penetrated through the oxide and reached the crystalline compound. If the operation is properly performed,



no gas will be disengaged, the whole of the nitrous gas will combine with the barium and form a nitrate; more water must be added, and the whole boiled, to carbonate the excess of the barium, and then a sufficient quantity of sulphuric acid added, that the sulphate may represent the proportion of the nitrate.

This analysis led M. Gaultier to the following:—

Sulphuric acid	65.59	5 atoms
Nitrous acid	23.96	2 atoms
Water	10.10	4 atoms.

*Journ. de Pharm.*

ARTICLE XI.—*Method of preparing some of the Salts of Iron.* By M. Beral.

The pharmaceutic preparations which owe their remedial properties to iron, are but rarely employed in medicine. There are, however, a number of cases in which they might be beneficially used. I have therefore thought that it might be interesting to detail the method of preparing several of the chalybeate articles.

*Liquid perchloride of iron.*

Peroxide of iron,	5 parts,
Hydrochloric acid,	19 parts.

Mix in a platina capsule, and boil for ten minutes to dissolve the oxide; concentrate the solution to 15 parts by a water bath, permit it to cool, and filter. This solution will be of a red brown colour; on the addition of water it becomes yellowish, if the hydrochlorate is neutral; and almost colourless, if it is acid. It is not decomposed by the air.

*Crystallised perchloride of iron.*

To obtain this product, pour a pound of liquid perchloride

of iron into a porcelain capsule, and eight ounces of liquid caustic potash into another; place these two capsules on a glass plate, and cover them with a bell glass. In 10 or 15 days, the chloride will be found crystallised in the form of granulated mammillary concretions; the fluid is to be poured off, and they are to be drained by turning the capsule over on the glass plate. This chloride is neutral, and very deliquescent. It should be kept in a glass stoppered bottle, with a wide mouth.

*Acetate of the peroxide of iron.*

Concentrated acetic acid,	16 parts,
Peroxide of iron, recently precipitated,	8 parts.

Heat the acid in a platina capsule, and saturate it with the oxide, adding it to excess. Withdraw it from the fire, permit it to cool, and filter through paper. This solution is of a vivid red, always acid, and unalterable in the air.

*Nitrate of the peroxide of iron.*

Crystallised citric acid,	4 parts,
Distilled water,	4 parts,
Peroxide of iron, recently precipitated,	8 parts.

Put the water and acid in a platina capsule and heat them; when the acid is dissolved, and the solution is at the boiling point, saturate it with peroxide, adding it to excess. Cool and filter. The quantity of liquid citrate obtained should be 16 parts. This solution is of a very deep red colour; it is always acid, but less so than the acetic solution.

*Tartrate of potash and iron.*

Bi-tartrate of potash in powder,	8 parts,
Distilled water,	24 parts,
Peroxide of iron, recently prepared,	q. s.

Mix the water and cremor tartar in a platina capsule, and boil; add as much moist peroxide of iron as is soluble in the fluid; saturate with a solution of caustic potash, filter and concentrate so as to obtain 20 parts of liquid. To obtain this salt

in a solid state, after having concentrated the liquid tartrate to a syrupy consistence, it is to be dried on the sides of the basin, by turning it, in all directions, over a moderate fire, till the salt is detached in scales. In this state, it is solid, transparent, of a deep colour, and very soluble in water. As it slightly attracts moisture, it should be kept in a well closed bottle.

*Liquid acetate of ammonia and iron.*

Liquid acetate of ammonia, 14 parts,

Liquid acetate of peroxide of iron, 2 parts.

Mix. This ferruginous spiritus mindereri is of a very deep red colour.

N.B. To prepare the above mentioned oxide of iron, termed peroxide of iron, recently precipitated; liquid perchloride of iron is to be mixed with a large quantity of water; the iron is to be precipitated with ammonia, washed several times, and subjected to pressure to get rid of the water. It will now form a pasty mass formed of oxide of iron and water.—*Journal de Pharmacie, October 1831.*

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ARTICLE XII.—*On External Revulsive Applications. By I. Fauré, Sen.*

Many medicines, which were formerly employed by physicians, have been lost sight of, and which, nevertheless, in many cases, merit a preference over those which time and practice have consecrated.

I was reminded of this truth during the public monthly meeting, of the 7th of February last, of the Royal Society of Medicine at Bourdeaux, by the communication of a very im-

portant practical fact which would have required the use of a revulsant whose action was instantaneous.

I know that practitioners are acquainted with the means of producing immediate redness and irritation of the skin; but here, as in other cases, the difficulties in the employment or other indications render the choice of them difficult.

The revulsant most prompt in its effects, would doubtless be caloric, applied either directly or united to water in the state of vapour, or even frictions made with acetic acid concentrated to 10 degrees; but the inconveniences attendant on these processes, render the application of them rarely possible.

The want of a rubefacient which would act in two or three minutes, whose action could be circumscribed and regulated so as to stop it at will, or give it, if required, the energy of a blister, leaves an acknowledged hiatus in practice, and furnishes to pharmacy an opportunity of offering to it a new therapeutic resource.

I do not claim the discovery of a revulsant enjoying all these advantages; it was brought to light by those chemists who applied themselves to the analysis of black mustard seed (*Sinapis nigra*); and if the art of healing has not profited by it for some years past, it is, without doubt, because the attention of physicians has not been sufficiently drawn to its merits, and that no one has yet fixed upon a reasonable and correct formulâ, which would warrant the existence in pharmacy of a ready made preparation whose effect would be sure and constant.

This is the double end which I proposed to myself in writing this note.

The powder of black mustard seed furnishes, by distillation in water, an acrid and caustic volatile oil, to which it owes almost all its medicinal properties; its application to the skin produces great redness and even blisters. The water arising from this distillation has been proposed as a substitute for the ordinary sinapisms, from its having the advantage of producing a more prompt action; let us examine the use of these two products as applicable to the subject which occupies us.

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Water distilled from powdered mustard, though holding in solution very little volatile oil, might, by reiterated applications, become, in certain circumstances, a substitute for sinapisms; but in violent cases, it would not be sufficiently active, and this water would be rarely identical in its effects.

By its energetical action, the volatile oil of mustard may become the basis of an excellent revulsant, and yet, although we are only considering an outward application, its direct use would require so much precaution, that we should be constantly afraid of serious accidents.

In order to determine a reasonable formula, it appeared to me less rational to try to increase the exciting force of distilled water of mustard, than to modify the acrid and caustic principle of the volatile oil. Among the mediums which I have submitted to different experiments, the spirituous ones, of a moderate density, have appeared to me most preferable.

Alcohol dissolves this volatile oil in large proportions, according to its density: highly rectified, it dries and crisps the skin, and assists the volatilization of the active principle before it can have acted sufficiently; if too weak, it dissolves but little volatile oil, and does not acquire the desirable efficacy.

After having thus recognised the necessity of fixing the strength of the alcohol so that, saturated with the volatile oil of mustard, it produces in a few minutes constant and invariable reddening effects; I have found out the proportions, the result of which, tried on a number of persons, and several times on myself, permits me to present with confidence the following formula:

Alcohol at 25 degrees of Baumé,   250 gram.

Volatile oil of mustard seed,       12 gram.

Mix and preserve it in a well stopped bottle.

This liquid produces a great irritation on the skin; it is sufficient to apply on the part a piece of fine flannel, or linen imbibed with the liquid, and to moisten it again in two or three minutes after, if it be necessary. The prickings produced by this application are the more sensibly felt from their



arising so quickly; redness of the skin is the consequence, and even pimples or blisters.

Before concluding, I will make an observation, which will not be without interest if not already known, that to suddenly quiet the pain occasioned by the effect of this revulsant, it is only necessary to pour two or three times over the irritated surface a few drops of sulphuric ether.—*Jour. de Pharm.*

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ARTICLE XIII.—*New Experiments on Bitter Almonds and their Essential Oil.* By MM. Robiquet and Boutron Charlard.

[Translated from the French by T. H. Powers.]

The elements of organic products are in general so complicated, that it is only by repeatedly reverting to them, that we can demonstrate their true composition. And we see, that by attentively studying substances of this kind, we discover things unperceived by those who have before examined them. This truth is more clearly demonstrated to us every day; for we have seen bile, blood, urine, milk, opium, cinchona and many other substances, successively become the object of new investigations, and each time some more or less interesting results have attested the utility of such undertakings. We must not then become weary of studying substances of this kind; and although the credit we receive may not always be proportionate to the difficulties overcome, we should not the less seek to acquire clear ideas, on these interesting points of the science. From motives of this nature, we have undertaken to examine bitter almonds and their essential oil. This singular product, which has already been often examined, is still far from being well known; and we have no doubt but that a

careful study of it would have conducted us to some important results; but being obliged to interrupt our investigations, and not being able to foresee at what time we shall be permitted to finish them, we have concluded to publish what we have done, in order to furnish our successors with the means of penetrating further.

It has resulted from all the researches which have yet been made on the volatile oil of bitter almonds, that this remarkable product is particularly distinguished from the other volatile oils by the promptitude with which it absorbs oxygen; and, above all, by the singular property which it possesses, of suddenly changing by means of this oxygenation into colourless needle-shaped crystals, which are acid, and preserve their character of acidity, though they be submitted to a dry heat, which does not seem to cause any change, except that of subliming them into handsome white silky tufts; or treated by boiling water, which dissolves them completely, and again deposits them by cooling. We are aware that this volatile oil has not only the odour of hydrocyanic acid, but that it contains, when fresh, a considerable quantity; that very probably it is to the presence of this acid, that it owes its poisonous properties; and that, nevertheless, it may preserve the odour of hydrocyanic acid without retaining any sensible traces of it. In fine, we moreover know, that this volatile oil, suitably treated by the caustic alkalies, furnishes a peculiar crystalline substance, which is neither acid nor alkaline, is soluble in both alcohol and water, and more so in hot than in cold.

We imagined that one of the principal questions to be solved was in relation to the nature of the acid formed by the oxygenation of the oil. This acid had clearly been obtained, and its principal characters described by one of us; but it remained to name it; this was less inconvenient, it must be owned, than to have given it a name without having obtained it, as has been sometimes done.

We at first occupied ourselves with this point, but had scarcely recognised the identity of this acid with that obtained

from benzoin, when we learnt that this result had been already announced in the German journals. In fine, we were assured that M. Strange, pharmacien at Basle, had published in the *Recueil de Pharmacie* of Buchner for 1822, a memoir in which he established that the crystals which form spontaneously and by exposure to the air, in the essential oil of bitter almonds, are nothing more than those of benzoic acid.

This first point once established, it remained for us to examine whether acid existed already formed in the essential oil, or if it was not developed by the oxygenation of the principles which were united with it. But we have been diverted from this study by another not less interesting question, which seemed to demand precedence; namely, that relative to the existence of the essential oil itself in bitter almonds. It appeared much more important to occupy ourselves at first with this question, as it was presumed that its solution would throw some light on the nature of this supposed essence. Now, one of us had already observed that the volatile oil, which is drawn from bitter almonds by distillation, could not all exist formed in them, and gave in support of this opinion, the want of odour and taste in the simple expressed oil of the same seeds. Every thing led us to think that if these two products existed together, they would both be obtained by pressure, since once obtained separately, they easily combine with each other, and, besides, we are familiar with several similar examples; for instance, it is known, that the seeds of the umbelliferæ furnish, by simple pressure, a product which contains both the fixed and volatile oil. But it is entirely different with the bitter almonds, since when they are free from moisture, the fixed oil which is separated mechanically, is altogether as insipid and inodorous as that extracted from the sweet almonds. This fact has been fully proved by M. Planche, and is confirmed by the daily practice of the perfumers, who manufacture, at the same time, from the bitter almonds, the fixed oil, which they sell as oil of sweet almonds, because it possesses all the characters of it, and make their almond paste of the residue or cake.

It is, nevertheless, true that under some circumstances, the fixed oil partakes of the odour and taste of the bitter almonds. M. Planche attributed it principally to the action of the heat, for it is sufficient, according to this skilful chemist, to press the bitter almonds between warm plates, for it to acquire the odour of the essential oil. But MM. Henry and Guibourt have since shown that this change cannot take place, without the influence of moisture.

These were the acknowledged opinions, and have served us as a point to set out from. Our first care was to examine them minutely: and we have seen, in fact, that when the bitter almonds are a little old, and consequently quite dry, the fixed oil is inodorous; and that it is the same with the residue, whether we leave it in mass or reduce it to powder; that nothing will develop the odour in the fixed oil, while it is sufficient to moisten the residue, in order to disengage immediately a well pronounced odour of hydrocyanic acid. Thus, without doubt, the essential oil, or the elements of it, are contained in the almond cake, and do not run from it with the fixed oil, by expression.

Supposing, from the observations first made, that this supposed essential oil resulted from the combination of a particular principle with a certain proportion of water, we have tried several modes of extracting this principle, without the intervention of moisture, and we have successively employed very concentrated ether and alcohol.

*Action of Ether on Almonds.* These several treatments have conducted us to some results so curious, as to merit attention. The ether to which we had recourse in the first place, had no other effect than to withdraw the last portions of fixed oil which the pressure had not been sufficient to remove.\*

\* The apparatus which we used for this extraction answered, perfectly, the end we had designed. It was a vessel with a straight neck, containing about a pint, furnished with a cork stopper, into which was fixed perpendicularly the lengthened extremity of a glass adapter, and the adapter was, itself, furnished with a well adjusted stopper; a glass stopper was also



This treatment terminated, we dried the powder in the air, and evaporated the tincture in close vessels, with the heat of a water bath. These two products, that is, the powder washed by ether, and the oil obtained by the washing, were both quite inodorous, but the new residue washed with water developed as much odour as before. Thus far, there was nothing surprising; but what has surprised us, is, that if powdered almonds be washed with ether and dried, and then treated a second time by ether, this second washing furnishes by evaporation on a water bath a product which contains the essential oil of bitter almonds. Thus, without doubt, water is indispensable for the formation of this oil.

*Action of Alcohol.* If, instead of treating as we have indicated the first residue of the etherial washing, we submit it several times to the direct action of concentrated boiling alcohol, we obtain, after four successive decoctions, all that this vehicle will take up of the almonds. We remarked that the first tincture deposited some small tufts of opaque crystals by cooling, which consisted of very short needles disposed in concentric rays. These crystals, which are generally formed on the sides of the vessel, were detached, and united on a filter. On the other hand, we mixed the four alcoholic tinctures in a retort, and distilled them in order to preserve the alcohol.

let into the lower part of the adapter, and adjusted in such a manner as to present an obstacle, without completely opposing the running off of the liquids. The apparatus being thus fixed, we introduced into the adapter a sufficient quantity of almond kernels reduced to a fine powder to fill it about two-thirds full; we afterwards poured on enough ether to cover the powder about two fingers' breadth deep. The stopper of the adapter was then adjusted, and covered with several strips of pasted filtering paper, in order to prevent the evaporation of the ether, as much as possible. The ether gradually filtered through the powder, and flowed off layer by layer, and the oil was, if we may so say, driven to the inferior part of the tube, in such a manner that the first portions of liquid which ran into the vessel were pure fixed oil, easily known by its colour and consistence, while, towards the end, the ether descended quite as fluid and colourless as when we had employed it. We concluded that by this means the powdered almonds had been completely deprived of all the fixed oil which they retained.



This concentration was cautiously continued until the residue had acquired the consistence of a syrup; it was then allowed to cool, and afterwards poured into a long receiver made by closing one end of a large tube, five or six times its bulk of rectified ether poured upon it, the open end of the tube stopped with a cork, and the whole strongly agitated for some moments; we then placed the tube in a vertical position, and left it until the next day. By cooling, it formed itself into three very distinct parts; the first and most fluid was of a light yellow colour, that which succeeded it was of an opaque white and semi-solid, the third was amber coloured, transparent and of a viscous consistence. We readily separated the first and third parts by means of a syphon,\* and the second being thick, was put to drain on a piece of fine linen. This mechanical separation performed, we occupied ourselves with purifying the different products. The first, which was little else than ether, was submitted to distillation in a water bath. The residue was a resinous yellow

\* The syphon used was made out of a thin tube of small diameter, which we were able to bend in the flame of a candle. We adapted this syphon to a stopper of a proper size for the tube receiver; afterwards we adapted a very small tube bent at right angles to the same stopper, and disposed it in such a manner that we might blow into the receiver. This done, we proceeded as follows: we substituted this stopper in place of that in the tube, and sunk the small branch of the syphon nearly to the surface of the second or middle liquid; the other branch communicated with a bottle; we then blew through the small tube in order to make the liquid ascend through the syphon, and then decanted the first part. We then poured on a similar quantity of fresh ether, agitated again, and the next day drew off as before. When this was entirely withdrawn, and the syphon well drained, we stopped the long branch with the end of the finger, and pushed the other through the cork to the bottom of the receiver. It is as well then to blow slightly through the long branch in order to remove any particles of the second or middle substance that may collect in it, notwithstanding the precaution already taken. We then let the liquids rest, in order that they might rearrange themselves. When this had taken place we blew slightly through the small curved tube, and let the under liquid run off through the syphon as long as it continued to do so clear. When all the under part is drawn off, the syphon will generally stop of itself, as the intermediate substance, which is pasty, will cause an obstruction, but if this shows a disposition to rise, it will be easily prevented by drawing the breath through the small curved tube.

liquid, of an acrid taste, which brought to mind what is called the green resin of vegetables. The white chalky matter that formed the intermediate parts was dissolved in boiling alcohol. The filtered solution deposited on cooling a number of small, white, needle-shaped crystals, of the same nature as the tufts deposited by the first alcoholic tincture of powdered bitter almonds.

The viscous liquid that formed the third part, was deprived of the ether which it had retained, by a moderate heat, it became of the consistence of honey, preserved its transparency, and possessed a sweet taste, together with a slight bitterness; we have not been able to separate any other principle from it.

Thus the alcoholic treatment furnished three different and very distinct products, viz. a resinous matter; a peculiar crystalline substance; and lastly a kind of liquid sugar. But what is most remarkable, is, that no one of these three products had any odour of bitter almonds, and that, nevertheless, the powder which had been successively treated by ether and alcohol, or only by alcohol, did not develop any odour of prussic acid on the addition of water. We tried in vain all the means which appeared to us the most capable of developing this odour, whether on each of the products taken separately, by uniting them, or by adding them to the powdered almonds from which they had been extracted.

There is, without doubt, a very volatile principle which serves as a tie for the others, and which is destroyed by the alcoholic treatment; what would seem to prove it, is, as we have before said, that the presence of hydrocyanic acid is very evident in the products of the distillation of bitter almonds, while here nothing will detect its existence, not even the action of caustic alkalies, which manifested it so promptly in the essential oil. We must remark, nevertheless, that the white crystalline matter gave out a considerable quantity of ammonia, when treated by a solution of caustic potass with heat. Since this substance contains nitrogen, may it not become, by means of an alteration and combination which are unknown to us,

one of the elements of the essential oil? We should be the more disposed to think, that this same substance possessed, even in its most pure state, the taste of bitter almonds, and that sweet almonds do not furnish any analogous principle. These observations determined us on studying this remarkable product particularly; and we shall give the results of our experiments; but, before we occupy ourselves with this subject, we will finish that relating to the almonds themselves, and we shall commence by repeating that the portion of bitter almonds which have undergone the action of alcohol, does not furnish by distillation with water a particle of essential oil, and that not only the product we obtained did not manifest the least odour of bitter almonds, but that the reagents did not show the least trace of hydrocyanic or any other acid. It is therefore certain that alcohol takes up or destroys, either the whole or at least a part of the essential oil. To assure ourselves whether the alcoholic residue contained any principle that might contribute to the prompt formation of prussic acid, which, under ordinary circumstances, is formed as soon as we moisten the powder, we treated a portion of this residue with cold distilled water; after some hours maceration we obtained, by filtering, a yellowish limpid liquid, insipid to the taste, frothing much by agitation, and coagulating with heat. All these properties are found in the sweet almonds, and M. Boullay made them known a long time since in a memoir published in the seventh volume of the *Journal de Pharmacie*.

We shall only remark in passing, that this coagulation, which some have attributed to vegetable albumen, presents some characters, which might seem to be derived from another body; and this was particularly observable when we experimented on the powdered almonds entirely deprived of fixed oil by ether, and afterwards treated by alcohol. In this case, the watery washing submitted to the action of heat, thickened, became consistent, but did not coagulate even when kept in a state of continued ebullition. If permitted to cool, the con-

sistence is augmented and we obtain a mass as solid as starch, but which, by heating anew, becomes slightly liquid; afterwards reassuming the same consistence on cooling: and it is possible to reproduce the same phenomena several times by different temperatures.

We never have heard that ordinary albumen presented any thing similar. That we may not be diverted from our principal objects, we shall not push this subject any further, but return to the watery washings; we will mention, however, that when coagulation is not effected by means of heat, some hours of repose are sufficient to separate from it a quantity of liquid, which affords by evaporation only a species of common gum. Thus we have not found in the residue any thing meriting particular attention.

[To be continued.]



## MINUTES OF THE COLLEGE.

*December 27, 1831.*—The Board of Trustees reported the election of Franklin R. Smith as a resident member.

The following gentlemen were duly elected honorary members: Professor Julius Ducatel, Baltimore; Dr Thomas I. Wray, Augusta; Dr Jacob Bigelow, Boston; and Michael F. Faraday, London, a foreign member.

A communication from Wm Hacquin was read, accompanied with specimens of Latin labels, printed on coloured paper, which were referred to a committee.

*January 1, 1832.*—The committee appointed to examine the labels submitted by Wm Hacquin for the approval of the College, reported and offered the following resolution, which was concurred in: “That the College cannot approve of the book of labels submitted to them, in as much, that they are not in conformity with the nomenclature adopted by the United States Pharmacopœia.

A committee was appointed to take into consideration the propriety of having a set of Latin labels printed by the College in conformity with the nomenclature adopted in the United States Pharmacopœia.

The subject of bringing into more general use the formulæ prescribed in the United States Pharmacopœia being under consideration, the following resolution was adopted: “That a committee be appointed to confer, with such committee as may be appointed by the College of Physicians, on the best means of introducing the Pharmacopœia of the United States for 1830 into general use as the standard of the shops, and the

Secretary was directed to communicate this resolution to the College of Physicians.

*February 28, 1832.*—The committee appointed to confer with such committee as might be appointed by the College of Physicians to consider the best means of procuring the general adoption of the Pharmacopœia of 1830, reported, that that body having appointed a committee of conference, the joint committees agreed to recommend to the respective Colleges the adoption of the following resolution, to be signed by the presidents and to be published in the different Medical and Pharmaceutical Journals: “Resolved, as the opinion of the Philadelphia College of Physicians and Philadelphia College of Pharmacy, that the United States Pharmacopœia of 1830, as revised by the National Medical Convention which met at Washington in January 1830, and published in Philadelphia, deserves the confidence of the medical and pharmaceutical professions; and for the purpose of promoting uniformity in pharmaceutical formulæ—the two Colleges do agree to adopt the said work as a standard of pharmacy, and recommend to their respective members to conform to its directions.”

The following form of an agreement was also adopted, and a committee appointed to procure the signatures of the members of this College thereto.

“The undersigned, members of the Philadelphia College of Pharmacy, convinced of the importance of having an uniform standard for the preparation of medicines, and believing the Pharmacopœia prepared by the National Medical Convention of 1820, and revised by that which met at Washington in January 1830, to be the best adapted to meet this object, do hereby agree to adopt the formulæ of the same as the standard of their shops, and to comply with its regulations in compounding the prescriptions of physicians, unless otherwise directed.”

The following is a copy of the agreement which has been submitted by the Philadelphia College of Physicians to its members.

“The undersigned, members of the Philadelphia College of Physicians, convinced of the importance of having an uniform

standard for the preparation of medicines, and believing the Pharmacopœia, prepared by the National Medical Convention of 1820, and revised by that which met at Washington in January 1830, to be the best adapted to meet this object, do hereby recognise the authority of the same, and agree to use their influence with the apothecaries to procure the adoption of the formulæ in their shops.”

The following gentlemen were duly elected honorary members: Dr John Torrey of New York, and Thomas Nuttall of Boston.

*March 27, 1832.*—The committee appointed to obtain the signatures of the members of the College of Pharmacy to the agreement approved at the last meeting, made the following report.

*To the President and Members of the Philadelphia College of Pharmacy.*

The committee appointed to obtain the signatures of the members of the College to the agreement respecting the Pharmacopœia, respectfully report:—

That they have attended to the duty assigned them in part, having obtained the signatures of nearly all the members of the College. The completion of this task, from a variety of unavoidable circumstances, has not been practicable; it will however be attended to, with as little delay as possible.

Your committee may state, for the satisfaction of their fellow members, that they were much gratified to find so universal an approval of the objects of the agreement, among those who were solicited to sign it, and believe, if the individual attention of the members is kept alive to it, that in a short time this much desired uniformity in pharmaceutical preparations may be accomplished. It would be more than could be expected that individuals will literally adopt all the formulæ in a work of this kind, however desirous they might be to do so, except they are individually convinced that every one of the formulæ is either than better or as good as any other.

It will hence be necessary for the College, ere it can expect

a universal adoption of it, to take some trouble to prove that the formulæ in it are based upon correct principles, and that they are not only as good as, but preferable to any others. In order to accomplish this, they propose that the College appoint a committee who shall, between this and the meeting in September, personally wait upon every member of the College who shall sign the agreement. By that time, it is believed, nearly all of the formulæ will come under his immediate review. Your committee certainly believe that no member who has signed the agreement would fail to comply with its requisitions, except he had, at least in his own opinion, a good reason. If it should be ascertained that any have not complied, this committee shall respectfully request the reasons which induced it, and if they should prove to be any supposed imperfections in the formulæ, they shall carefully note them down, and report them to the chairman of the committee on the Pharmacopœia, who shall report them to the stated meeting in September.

The committee shall invite from all, free and unreserved strictures of any and every kind.

They also respectfully suggest, that the secretary of the College be directed to state, on the notices of the meeting in that month, that this report will be read, and urge the attendance of all the members at that meeting. At that meeting they would recommend, a free discussion be encouraged upon all of the formulæ objected to. And furthermore, that each formula, as shall be decided by the College as requiring alteration or amendment, shall be submitted to the College of Physicians, with the reasons for such alterations or amendments, requesting their concurrence therein, and should they approve thereof, these formulæ shall be considered the standard, as respects this city, in place of those which may be amended.

The Secretary shall require at least 100 copies of the amended formulæ to be printed, a copy of which shall be sent to each member of the College living in the city.

Your committee believe that except some such arrangement

as this is made, we shall fail in achieving the object which all acknowledge to be of such great magnitude. They also believe that the adoption of such measures as these, would have a tendency to unite the apothecaries of the city more firmly than they ever have been before, and moreover, to interest many who are now lukewarm in the laudable objects of our association.

J. SCATTERGOOD.

*On behalf of the Committee.*

Whereupon it was on motion resolved that the College approve of the suggestions of the committee, and the subject was referred back to them to carry into effect.

The Publication Committee made a report which was accepted.

J. Clemson, manufacturing chemist, now resident in Philadelphia, was elected an honorary member.

The following gentlemen were duly elected officers, trustees, &c. for the ensuing year.

*President*, Daniel B. Smith.

*Vice Presidents*, S. Jackson, M.D., Henry Troth.

*Recording Secretary*, Charles Ellis.

*Corresponding Secretary*, Elias Durand.

*Treasurer*, E. B. Garrigues.

*Trustees*, Edward Needles, Warden Morris, Charles Dingee, A. Fullerton, Jun., J. Reakirt, John Carter, S. C. Sheppard, John C. Allen.

*Publishing Committee*, D. B. Smith, G. B. Wood, M.D., R. E. Griffith, M.D., Charles Ellis, Jos. Scattergood.



## MISCELLANY.

*Oil of Ocymum basilicum*, by M. Bonastre.—Great uncertainty exists, as to whether, under all circumstances, volatile oils, or at least the majority of volatile oils, contain within themselves, the crystalline matter which serves to distinguish many of them. It is indeed very remarkable that from plants which are identically the same, there may be obtained, by distillation, some volatile oils, which are susceptible of crystallization, and others which are not. I have endeavoured to discover the cause of this species of anomaly, but have never arrived at any satisfactory results.

Some years ago, M. Dublanc, Jun. presented to the society some volatile oil of peppermint, which, by a diminution of temperature to some degrees below zero, became almost entirely crystallized.

Since that time, and in consequence of the invasion of the cholera-morbus in Europe, medical science has endeavoured, by all possible means, to oppose the ravages of this fatal disease; and in some countries, particularly in the north of Europe, essence of peppermint has been extolled as a more or less advantageous remedy for cholera.

On account of this opinion, there has been a considerable demand in France, for the volatile oil of peppermint, and our country alone, not being able to afford a sufficient supply, we have been obliged to have recourse to foreign markets.

From the information which I have collected, and which has been very exact, I find that in the month of July last, 700 pounds of volatile oil of peppermint were exported from France to Germany. Of this enormous quantity, which must startle all physiological physicians, France only furnished 200 pounds; the other 500 came from abroad, especially from America.

An important observation, which I have been enabled to make, is that almost all the essence of peppermint from America, possesses the singular property of forming beautiful crystals, at some degrees below zero.

The essence of mint distilled in France, does not possess this remarkable property, at least under all circumstances, or in the same degree.

The essence of sweet basil which I have the honour of presenting to the society, also possesses the property of crystallization; unfortunately, I can give no certain account of the time required for this process; it is sufficient to state, that the crystals formed in the volatile oil in the midst of the fluid portion of the upper part of the phial. The concrete portion occupied the lower part.

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The crystals of the essence of sweet basil are pyramids with four very narrow faces.

They are but slightly soluble in cold water, but considerably so in boiling water; it is sufficient to filter it warm, and let it remain undisturbed; in a few hours, the crystals deposit in the form of regular tetrahedrons, tolerably white, and perfectly transparent.

They are partly soluble in cold alcohol; this solution gives a red colour to litmus paper; boiling alcohol dissolves them completely; they crystallize perfectly by cooling, and in the same manner as those described above, viz. in pyramids with four faces.

Under these circumstances, the first crystals deposited from the alcoholic liquid occupy the circumference of the capsule; they form groups at certain distances, in fine radiating fasciculi, composed of an innumerable quantity of well defined needles.

The crystals progressively deposited, from the same solution, at the bottom of the capsule, are of a larger size than those on the circumference.

Crystals derived from the aqueous solution have scarcely any taste; those from the alcoholic, on the contrary, possess the smell and taste of the oil of sweet basil, though in a less degree.

One part of these crystals will not dissolve entirely in six parts of sulphuric ether. They are, however, very soluble in cold nitric acid, and do not cause any remarkable coloration. Acetic acid dissolves them readily, and on the evaporation of the acid, crystals are deposited in silky filaments. Sulphuric acid reddens them sensibly.

An excess of caustic ammonia dissolves them; if water be poured into the solution, the latter becomes turbid, but does not froth when shaken, as takes place on a combination of the essence of cloves with the same alkali. When placed on burning coals, they burn and diffuse much smoke, and some odour.

If I had possessed a greater quantity of crystals, I should have been able to make more variation in my experiments, principally with hot nitric acid, which, operating upon a considerable mass, might have afforded some new product.

This fact suggests the following observation, that the concrete and crystalline matter of the volatile oil of sweet basil, though derived from a plant of the family of the labiatae, still differs in many respects from the stearopton of the oil of sage, described by M. E. Herberger, and resembles, perhaps, more that of peppermint.

Besides, two specimens of the crystalline matter of the volatile oil of sweet basil, which I have the honour of presenting to the society, (the first of which is the result of aqueous solutions, and the second of an alcoholic solution) allow any who have seen the crystalline matter of the volatile oil of peppermint, to judge what analogy there can be between the regular form of the two crystalline matters.

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*Oil of Roses.*—Professor Gobel of Dorpat has analysed the true oil of roses. The specimen was nearly colourless, but so strong as to cause headach on inhalation; a single drop dissolved in alcohol, was sufficient to fill a room with an agreeable odour for several days. It congealed into a white, foliated, transparent mass when exposed to a temperature of 32° F., but became fluid again at 72°. Alcohol of 0.815, dissolved 1-180th part of it at 65° F. A drop required 8000 parts distilled water to perfectly dissolve it. It is composed of carbon 69.66, hydrogen 16.06, oxygen 14.29=100.—*Edin. New Philos. Journ. Oct. 1831.*

*Crystallization of Perchloric Acid.*—M. Serullas states that the perchloric acid may be always crystallised by pursuing the following plan. Sulphuric and perchloric acid are to be successively introduced into a small retort, through a long tube; the beak of the retort is to be inserted into a tube curved and drawn to a fine point at the other extremity. Heat is to be applied, and when the liquid boils, and is kept in this state for some time, over a small fire, it will be seen to pass over into the tube and solidify there; the tube is to be kept cool with water; thick white fumes escape at the small end of it. The operation must be stopped before the mixture is discoloured, and as soon as any liquid passes over, which does not congeal. The experiment should always be performed with small quantities of the perchloric acid, say 8 to 10 drachms. Liquid perchloric acid may be concentrated by evaporation in a capsule, or what is better, in a small retort. The first portions that pass over are to be thrown away, as they are only water. M. Serullas has obtained it of the density of 1.65.—*Journ. de Chim. Med. June 1831.*

*Hydrocyanic Acid.*—The following case, related by Dr Damison, shows the necessity of great caution with regard to this article. A druggist had some hydrocyanic acid in a ground stoppered vial; as it had been prepared almost three months, thinking it was decomposed, he opened the bottle and applied it to his nose, to ascertain if the acid retained any smell; he instantly fell and remained for half an hour without giving the least signs of life. He finally recovered, after an illness of several days.—*Ibid. July 1831.*

*Analysis of the Wood and Bark of the Guaiacum officinale.*—These have been examined by Mr Tromsdorff, with the following results.

	<i>Bark.</i>	<i>Wood.</i>
Peculiar resin, different from gum resin of guaiacum	23	10
Resin of guaiacum		260
Gum	8	
Peculiar extractive matter of a bitter, pungent taste	48	8
Yellowish brown colouring matter	41	
Mucous extractive matter, with sulphate of lime	120	28
Woody fibre	760=1000	694=1000.
		<i>Ibid.</i>

*Oiled Silk.*—The smell of this article, which is so disagreeable to many persons, can be removed, says M. Chevallier, by submitting it in a closed vessel, to the fumes of chlorine for ten or twelve hours, and then exposing it for a short time to the air.—*Ibid.*

*State of Mercury in Mercurial Ointment, by M. Mitscherlich.*—The mercurial ointment employed occupied four weeks in preparing; part of it was set to dissolve at a moderate temperature in alcohol, containing caustic potash in solution. The mercury was separated in the metallic state, and formed one globule at the bottom of the vessel; the solution was filtered, and the metal was carefully removed from beneath the filter; a white matter remained, which was not removed by washing, and which, heated in a tube, gave no metallic mercury, nor did it sublime. From this

experiment it appears that the ointment does not contain oxide, but metallic mercury. To be certain whether, by the reaction of the alcohol and potash, the oxide had not been reduced, the following experiment was made: 1.101 gramme of protoxide of mercury was triturated for a long time with lard. The ointment thus prepared was subjected to alcohol mixed with potash, as in the preceding experiment. The portion remaining undissolved had not the least appearance of metallic mercury; it weighed 1.196; submitted to distillation with muriatic acid, no metallic mercury appeared, but 1.29 gramme of proto-chloride of mercury, equivalent to 1.019 of protoxide of mercury. A small portion of the sediment, when heated, did not sublime.—*Philos. Mag. from Hensman's Repertoire.*

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*Chromium.*—The usual process for obtaining this metal, by employing the oxide and charcoal, never succeeding well, M. Vauquelin has proposed the following mode of reducing it from chromic acid, 72 parts of which will yield 24 of metallic chromium. Treat chromate of lead in fine powder, with four or five times its weight of muriatic acid, until it is perfectly dissolved; then evaporate to dryness, and dissolve the muriate of chrome by alcohol, that there may be no chloride of lead. Evaporate again at a moderate temperature, to the consistence of a syrup, and make it into a mass with a sufficient quantity of oil and a little charcoal, so as to form a paste; put it in a small crucible, inclosed in another crucible filled with charcoal powder, and heat in a bright forge fire for about an hour.—*Annal. de Chim.*

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*Crystallization of Bismuth.*—The following process is given by M. Quesneville, Jun. to obtain beautiful crystals of bismuth. The metal is to be melted in a crucible, and small quantities of nitre occasionally added, the heat being raised so as to decompose the nitre, and the whole well stirred; after continuing the operation for some hours, the metal assumes green and yellow colours which remain even after it has cooled; if it presents only rose, violet, or indigo tints, and becomes colourless when cold, the crystals will not be fine. When it has acquired the proper hue, it is to be poured into a hot ladle, and the surface prevented from cooling more rapidly than the bottom, by being covered with a hot iron. The cooling should be rather sudden; or otherwise the metal crystallises in layers; when a crust has formed at the surface, a hole should be made through by means of a hot coal, and the fluid portion poured out; after the remainder has become cool it may be broken and the crystals will be found very perfect.—*Journ. de Pharmacie.*

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*A new Gum Elemi from Bengal.*—M. Guibourt describes this resin as soft, having a strong smell which becomes pleasant on admixture with the air. It is contained in joints of bamboo, about twelve inches long by two in diameter; in this state it has recently been imported into France from Calcutta. M. Guibourt having sent some of it to Mr Pereira, Professor of Pharmacy and Materia Medica to the General Dispensary in London, requesting information respecting it, received the following account of it from him. That it was known in London, but had not been applied to any use; that Dr Wallich stated that it was known in Bengal by the name of *Guggul*, and is very similar to elemi, being, in all probability, produced by the *Amyris agallocha*, a tree found in the mountainous countries bordering on the districts



of Chittagong and Sillet, towards the north-east frontiers of Bengal.—*Journ. de Chim. Med.*

*Hydrocyanic Acid.*—M. Tilloy states that he has succeeded in preparing a medicinal hydrocyanic acid, the effects of which do not vary, and which can be preserved for several years, without any sensible alteration; this is

Cyanide of mercury	1 part,
Distilled water	4 parts,
Alcohol at 36° Baume	4 parts.

Dissolve the cyanide of mercury in the water, by aid of heat, and then mix it with the alcohol; add a very slight excess of hydro-sulphuric acid; throw in subcarbonate of lead; agitate several times, and distil in a water bath, so as to obtain all the alcohol saturated with the hydrocyanic acid.—*Journ. de Chim. Med.*

*Cyanide of Potassium.*—M. Chevallier observes that no work hitherto published contains an exact process for obtaining the cyanide of potash in a pure state. The usual plan is to calcine the ferro-hydrocyanate of potassa, then to dissolve it in distilled water, filter and evaporate to dryness. The procedure is impracticable, for the cyanide of potassa decomposes water on coming in contact with it. The result, therefore, would be hydrocyanate of potassa, and in heating this all the hydrocyanic acid escapes, and the residue will be merely potassa.

I have prepared this salt by calcining the ferro-hydrocyanate of potassa, then separating the cyanide of potassa from the quadricarburet of iron by pure alcohol, on distilling which, cyanide of potassa is obtained very pure and white.—*Ibid.*

*Oil of Bitter Almonds.*—From a memoir by MM. Robiquet and Boutron-Charland, in the *Annales de Chimie*, it appears that the volatile oil of bitter almonds does not pre-exist in the fruit, and that water is essential to its formation; 2d, that this oil becomes acid on exposure to the air, and furnishes benzoic acid, which, like the oil, did not pre-exist in the almonds; 3d, that they contain a peculiar principle, to which their bitterness appears to be entirely owing. This principle they have named *Amygdaline*; it exists combined with a saccharine matter, gum, a resinous matter, and an animal matter, which was regarded as vegetable albumine, but differs from this latter in several important particulars. After having treated this residue with the sulphuric ether, to get rid of these remaining portions of fixed oil, it is to be boiled with concentrated alcohol, which will dissolve the resinous matter the sugar and the amygdaline. In evaporating this solution to a syrup like consistence, and adding to it five or six times its volume of sulphuric ether, it separates, after having been shaken and then permitted to remain undisturbed, into three distinct layers, the upper consisting of ether holding the resinous matter in solution, the lower, which is viscous, of an amber colour, is the saccharine matter, whilst the intermediate is of a semi-solid consistence, of a white colour, and is amygdaline. This is to be purified by dissolving it in hot alcohol; on filtering it deposits as it cools a multitude of minute white needle like crystals.

Amygdaline has no action on test papers; it is inodorous, of a saccharine taste, mixed with a subsequent flavour of bitter almonds. It is not volatile; when heated it swells, giving out a smell like burnt sugar, which is succeeded by one like the hawthorn; when treated with a solution of caustic potash, it is decomposed, emitting a smell of volatile alkali. Warm nitric acid transforms it into benzoic acid.



From an analysis of it by MM. Henry, Jun. and Plisson, it appears to be composed of

Carbon	58,56
Hydrogen	7,08
Nitrogen	3,62
Oxygen	30,72.=99.98

*Ibid.*

*Sulphuret of Carbon.*—This article, discovered in 1796, has not as yet been admitted into the Pharmacopœias. From some experiments of MM. Wertzter and Pellengam, it appears: 1. That the sulphuret of carbon is one of the most energetic of the diffusible stimuli. 2. That it forcibly excites the action of the heart and arteries. 3. Its internal use soon occasions an acceleration of the pulse, an augmentation of the temperature, and an afflux of blood previously excited, especially towards the cutaneous and genito-urinary apparatuses. 4. The most prominent secondary symptoms it produces, are abundant sweats, an augmentation of the urinary secretion, and menstruation in females. 5. It has proved useful in chronic rheumatisms, without fever, in gout, &c. 6. On account of its great stimulating action on the arterial system its internal use is contraindicated in congestions of blood towards the internal organs, as in acute fevers.

The dose is from three to eight drops in barley or rice water, or in mucilage or syrup. The following tincture may be given in doses of from five to ten drops.

R.—Sulphuret of carbon	dr. ij
Pure alcohol	oz. iv.

Dr Wertzter also employs the following liniment over the affected part.

R.—Sulphuret of carbon	dr. ij
Camphorated spirits	dr. iv.

Sometimes instead of the latter ingredient he uses two ounces of olive oil.—*Jour. de Chim. Med.*

*Oxalic Acid.*—M. Gay Lussac states that when this acid is heated in a retort, a large quantity of a very inflammable gas is produced, which is composed of six parts of carbonic acid and five of oxide of carbon. From this he was led to believe that oxalic acid might be regarded as a hypo-carbonic acid.—*Ibid.*

☞ *Perchloric Acid as a test for the Mineral Alkalies.*—From a paper on this subject by M. Serullas, it appears, that if a few drops of perchloric acid be added to a solution of potash and soda, a precipitate of perchlorate of potash is instantly formed, the perchlorate of soda, or the soda, if there be not an excess of acid used, remains in solution, whence they can be separated by concentrated alcohol, which, at the same time precipitates the small quantity of perchlorate of potash held in solution. A solution of perchlorate of soda, on the addition of potash, lets fall a precipitate of perchlorate of potash. When perchloric acid is added to solutions of the sulphate, nitrate, hydrochlorate, bromate, hydrobromate or hydriodate of potash, it forms a precipitate and the acids become free, and may be separated by means of concentrated alcohol. From these experiments it appears, that the perchloric acid forms an almost insoluble salt with potash, requiring to dissolve it more than 60 times

its weight of water at  $15+0$ . 2. That soda forms a very deliquescent salt, exceedingly soluble in water and concentrated alcohol. 3. That the perchlorate of potash, on the contrary, is insoluble in alcohol. Finally, that by means of perchloric acid, the salts of potash may be decomposed, and the acid separated.—*Ibid.*

*On Populine, extracted from a memoir by M. Braconnet.*—This chemist has given the name of *Populine*, to an immediate principle, which appears to exist in the bark of different species of poplars, in that of the aspen, but which is found in the greatest quantity, in the leaves of the latter.

It may be obtained as follows:—A decoction of these leaves is to be made, and filtered whilst warm; sub-acetate of lead is now to be added, which causes a yellow precipitate; the liquid is then to be evaporated to the consistence of a clear syrup; and on cooling, the populine is precipitated in a crystalline form. This precipitate is to be forcibly pressed in a linen cloth, and about one hundred and sixty times its weight of water, and a little animal charcoal added to it; then the whole boiled and filtered; on cooling the populine separates in soft mass, composed of exceedingly fine silky needles. These crystals are to be drained and dried on blotting paper, and will then present the appearance of a very light mass, of a brilliant snow white colour.

The populine thus obtained has a saccharine taste, not unlike that of liquorice. It is soluble in two thousand parts of cold water, and one hundred and sixty times its weight of boiling water; and is still more soluble in boiling alcohol. It readily dissolves in cold concentrated acetic acid, as well as in nitric; it may be almost wholly precipitated from these solutions by the addition of water and the alkalis.

The same result takes place with phosphoric acid; but when this acid is very concentrated, it rapidly converts it, even when cold, into a resin. To be brief, the author has found that the mineral acids give rise to analogous phenomena, with both salicine and populine. The latter, treated with nitric acid, furnishes much carbazotic acid, without any trace of oxalic acid. Treated with potash, using proper precautions, it is transformed into oxalic acid.

Subjected to the action of fire, populine is changed into a transparent, colourless fluid: it takes fire and burns, giving out a peculiar aromatic odour, an odour having an analogy developed during the combustion of resinous matters. When distilled, populine swells up, and gives rise to a product, having an oleaginous appearance, which concretes and crystallises on cooling. If these crystals be pressed between blotting paper, they are deprived of a pyroxygenated oil, which is very acrid and having the smell of hawthorn, though much more powerful; there is also obtained a substance crystallised in micaceous, silvery scales, having all the properties of benzoic acid. It therefore appears that populine gives the same results on distillation, as the amygdaline of MM. Robiquet and Boutron Charlard.

Populine does not appear susceptible of forming a union with protoxide of lead; if it is boiled with phosphorus and water, it undergoes no alteration. Chlorine and iodine have no action on it.—*Journ. de Chim. Med.*

*Vulpuline.*—M. Bebert of Chambery has discovered a new substance, to which he gives the name of vulpuline, in the *Lichen vulpinus*, L. The plant is of a deep yellow colour, which colour is wholly resident in its external membrane. When

heated with alcohol, the solution deposits, on cooling, a yellow matter which is soluble in ether and alcohol, and by spontaneous evaporation affords beautiful yellow crystals, which are pure vulpuline. This substance is crystalline, transparent, of a rich lemon colour, unalterable in the air, fusible by heat, and recrystallisable on cooling, volatilisable without alteration, rendered turbid by chlorine, not decomposed by the concentrated mineral acids, slightly soluble in cold water though giving it a decided yellow colour, very soluble in boiling water, decomposed by acetate of lead, hydrochlorate of tin, and the two nitrates of mercury. Vulpuline may be considered a new vegetable acid, as its solution reddens test papers, and its ammonical solution, evaporated to dryness, leaves a residue, from which ammonia can be disengaged by potash. The lichen itself appears to contain vulpuline in a free state, as its crystals are very perceptible. M. Bebert is of opinion that this substance will prove valuable as a yellow dye.—*Journ. de Pharm. December 1831.*

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*Burnt Sponge.*—From an interesting paper on sponge and its products by M. Guibourt, we extract the following results. To obtain a burnt sponge rich in iodine, and efficacious against goitre, the following precautions must be observed. The sponge to be selected should be unwashed, having a strong odour, firm and compact. It is to be then put into a roaster similar to that used for coffee, and heated over a moderate fire, till it becomes of a blackish brown colour, when it is to be taken out, pulverised and enclosed in a well stopped glass bottle. It is always better when recently prepared, for even those sponges containing most iodine when first burnt, retain a very small portion of this product at the end of a year.—*Journ. de Chim. Med. December 1831.*

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*Protoxide of Copper.*—The most simple and easy mode of obtaining the protoxide of copper in a pure state, is the following. The copper is to be dissolved in hydrochloric acid, to which are to be gradually added small portions of nitric acid; the solution is then to be evaporated to dryness, and the residuum heated to fusion; it is thus transformed into a brown crystalline chloride. It is now to be melted with anhydrous carbonate of soda, in the proportion of ten parts of the former to six of the latter, in a covered crucible and at a low red heat. The mass is to be treated with water to dissolve the chloride of iodine that has formed; the protoxide of copper separates in the form of a beautiful red powder, which is to be washed and dried. If sal ammoniac be added to the above mentioned mixture, the whole chloride is reduced, as may readily be supposed, and separates in a spongy form, when the mass is mingled with water.—*Annales de Chim. July 1831.*











GERANIUM MACULATUM.

(Spotted Crane's-bill.)

*Drawn from Nature by W.H.C. Barton.*

# JOURNAL

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## Original Communications.

ARTICLE XIV.—*On Geranium Maculatum.* By R. Eglesfeld Griffith, M.D.

Nat. Ord. GERANICEÆ.

Sex. Syst. MONODELPHIA DECANDRIA.

GERANIUM. *Calyx*, 5-leaved. *Petals*, 5, regular. *Nectarium*, 5 melliferous glands adnate to the base of the longer filaments. *Arilli*, 5, 1-seeded, awned, awns naked and straight.—*Nuttall*.

*G. maculatum*. Erect, retrorsely pubescent; stem dichotomous; leaves opposite; 3-5 parted, incised; upper ones sessile; peduncles elongated; two flowered; petals obovate.—*Willdenow*.

*Synon.* *G. Noveboracense*. Amæn. Acad. vol. 4, p. 522.

*G. caule erecto herbaceo, foliis oppositis quinquepartitis incisis, &c.* Cavanilles.

*G. batrachioides Americanum maculatum, &c.* Dillenius. Hort. Elth.

*G. maculatum*. L. Sp. pl. 955. Mich. Fl. Bor. Am. vol. 2, p. 38. Bigelow, Med. Bot. p. 84. Muhl. Cat. Pl. Am. sep. p. 62. Barton, Comp. Fl. Phil. vol. 2, p. 63. Nuttall, Gen. vol. 2, p. 80.

*Icon.* Dill. Elth. t. 131, f. 159. Bigelow, Med. Bot. t. 8. Barton, Med. Bot. t. 13.

VOL. IV.—M

*Common names.* Crowfoot. Alum Root. Common Cranes Bill, &c.

*Pharm.* Geranium, U. S. Pharm.

*Offic. Root.* Thick, rough, knobby, of a dark brown colour externally, of a pale flesh colour internally; taste astringent without being bitter; inodorous.

*Description.* Root perennial, irregularly gibbous and horizontal, brownish mottled with green externally, and greenish white internally. From the root spring a number of radical leaves and one or more stems; these are erect and terete, of a green colour, and furnished with reflexed hairs. At the height of six, eight or ten inches from the ground, the stem becomes forked; and at the point of division is furnished with two large petiolate leaves which are generally reflexed. Leaves on the upper part of the stem either with very short petioles or sessile. The peduncles arise from the dichotomous divisions of the stem, and support two flowers on short pedicels. The calyx consists of five oval, lanceolate, ribbed, cuspidate segments, plumosely ciliate on their outer margin and membranous on the other; sometimes three of the segments only are ciliate. Petals five, obovate, not emarginate. Stamens ten, furnished at base with glands, and terminated by oblong convex deciduous anthers of a purple colour. Germ ovate. Style persistent, the length of the stamens at first, but afterwards becoming elongated. Stigmas five. Capsule containing five seeds, which, when mature, become detached by the elasticity of the awns.

There are several varieties both as respects the form of the foliage and the colour of the flowers; those which have been founded on the relative size and mode of growth appear to depend solely on accidental causes, as soil, exposure, &c. It is a beautiful plant, deserving of cultivation.

*Habitat.* This species is found in all parts of the United States, generally growing in hedges, borders of damp woods, usually flourishing most luxuriantly in low grounds, though it is by no means confined to these situations. It flowers in the spring about May.

*Bot. History.* The genus *Geranium*, which derives its



name from a Greek word signifying a crane, from the supposed resemblance between its persistent style and the bill of that bird, was formerly very extensive and included many anomalous species. L'Heritier, however, divided it into, *Pelargonium*, consisting chiefly of the herbaceous species with seven stamens, principally natives of southern Africa, and extensively cultivated in our greenhouses; *Erodium*, or those species having but five stamens, and *Geranium*, which is restricted to such as are furnished with ten of these organs.

*Med. History.* The *Geranium* appears to have been well known to, and highly prized by, the aboriginal inhabitants of the United States, and to have been employed by them in all cases where astringents were supposed to be useful. The first account, however, of its medical virtues, as far as we have been able to ascertain, was given by Coelln in the fourth volume of the *Amœnitates Academicæ*, on the authority of Cadwallader Colden; he states that it was found useful in dysenteries, “*decoctum radicis hujus plantæ ad dysenteriam nostratibus in usu est.*” Shoepf, who appears to have considered that every plant, from “the hyssop which grows on the wall, to the cedar of Libanus,” must be possessed of some medicinal properties, was not likely to pass over one which manifested such marked qualities as the *Geranium*; he observes of it, “*radix leviter astringens, vulneraria habetur et ad dysenteriam laudatur.*” Subsequently it was recognized as a regular article of the *materia medica*, and has been admitted into the primary catalogue of medicinal substances in the United States Pharmacopœia.

*Medical Properties and Uses.* The united testimony of all medical practitioners, who have given the *Geranium* a fair trial, amply verifies its powerfully astringent properties, and that it is at least equal to kino in all cases to which that resin is applicable. As to the peculiar and specific powers which have been ascribed to it by some writers, they are wholly fallacious. The too common custom of overrating the remedial virtues of different articles of the *materia medica*, has been

productive of injury, and has tended in no slight degree to retard the advance of therapeutic knowledge. Accident, or a combination of circumstances, may render the employment of a certain plant or preparation exceedingly successful in the hands of a practitioner; and the consequence naturally is, that he either holds it out to the world as a specific, or at least bestows on it such unqualified praise, as to lead to its general use; in most instances disappointment is the result, not that the article may not in reality be a valuable addition to the materia medica, but that too much has been expected from it in the cure or alleviation of disease. This has a tendency to bring it into actual discredit, instead of settling its proper sphere of usefulness, and of occasioning the neglect of a medicine that under other circumstances might have proved eminently beneficial. To be enabled then to judge of the real powers of the article under consideration, it is necessary to refer to the testimony of those who have witnessed its remedial effects. The nature of this Journal will, however, prevent our entering into this subject in any detail, and compels us to a mere statement of the results obtained by different practitioners; neither is this a proper place to discuss whether the practice of employing astringents in dysentery or diarrhœa is not contra-indicated by the laws of physiology and just reasoning; all that is wished, is to establish the relative value of the Geranium as regards other articles of the same class.

The testimonies of Colden and Shoepf, in relation to the supposed efficacy of the Geranium in dysentery, have already been adverted to; to which may be added that in many parts of the United States it is familiarly known under the name of alum root, and is used in the secondary stages of bowel complaints. In cholera infantum the late Professor Barton recommended a decoction of it in milk, and Dr Eberle states that it is extensively used for this complaint by the inhabitants of Lancaster county.

In hemorrhages, as may be *a priori* supposed, it has been resorted to with various degrees of success, and it is probable

that it is fully equal to any other article of the vegetable astringent class, in those few cases where this mode of treatment is indicated. As a remedy in aphthous affections of the mouth and in ulcerations of the fauces and tonsils, consecutive to cynanche tonsillaris, much more is to be expected from it when used as a gargle. Dr Eberle states, "I have frequently used a strong decoction of the root, the *Geranium Maculatum*, in cynanche tonsillaris, and sometimes with evident advantage. As a gargle in ulcers of the tongue and fauces, I have found it highly useful. In a chronic and very obstinate case of aphthous ulceration of the mouth, after various articles had been used by other physicians and myself unsuccessfully, the patient was relieved by the use of gargles made of the root of this plant." This testimony of Dr Eberle is confirmed by Zollickoffer and others.

As to the suggestion of Professor Barton, that it might prove useful in nephritis, we agree with the author of "Vegetable Materia Medica of the United States," that it is not entitled to much weight, as it certainly does not possess any diuretic properties; in the convalescence from this complaint it may, however, have occasionally been beneficial as a tonic.

In gonorrhœa the infusion has done some good as an injection, acting in all probability in the same manner as the more commonly employed articles of sugar of lead and sulphate of zinc.

In fact, we have before stated, the *Geranium* is a powerful astringent, and, like the rest of its class, is often of service in the secondary stages of some inflammatory complaints, but is always contra-indicated prior to the reduction of general or local excitement by antiphlogistics.

*Pharm. Preparations and Mode of Administration.* The *Geranium* may be given in a variety of modes, in tincture, decoction, infusion, in powder and in extract. The dose of the first is from two to four drachms, of the powder from fifteen to forty grains, of the extract from ten to twenty grains. The decoction is made by boiling one ounce of the

root in half a pint of water, of which one or two tablespoons full may be administered at a time. The infusion is made in the same proportions, but the dose is somewhat larger.

*Analysis.* Dr Bigelow gives the result of an examination of this root, and states that it contains gallic acid and tannin, affording a larger precipitate than kino on being treated with gelatin. A later series of observations by Dr Staples (Journ. Pharm. Vol. I. p. 171) show that it contains a large quantity of gallic acid, tannin, mucilage in small proportion, amadin, red colouring matter, which is principally furnished by the cortical portion of the root, a small quantity of resin, and a crystallizable vegetable principle.

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ARTICLE XV.—*Observations on the Pharmacopœia of the United States.* By George B. Wood, M.D., Professor of Materia Medica and Pharmacy in the Philadelphia College of Pharmacy.

[Continued from Vol. III. p. 304.]

In a late edition of the work entitled “The American Dispensatory, by John Redman Coxe, M.D.” numerous critical annotations upon the United States Pharmacopœia of 1830 have been introduced, which, as they may produce erroneous impressions upon those who are not familiar with pharmaceutical subjects, require a more particular notice than may, perhaps, be due to their intrinsic merit. It is highly desirable that the Pharmacopœia should possess, as well as deserve, the general confidence; and its friends are bound not only to make the public acquainted with what they conceive to be its merits, but to protect it, as much as may lie in their power, from the influence of unfavourable and incorrect criticism. The con-



nexion of the writer with the Pharmacopœia, as one of the publishing committee, renders it peculiarly proper that he should appear in its defence; as he may be supposed to be familiar with the considerations which influenced any particular modification of the original work, and therefore better qualified than one wholly unconcerned in its preparation, to explain difficulties, or to answer objections which may be brought against it. The editor of the Dispensatory has been pleased to designate the work in question, from the place where it was printed, as the Philadelphia Pharmacopœia; though, as it comes out under the authority of a convention assembled at Washington from different parts of the union, he might, with greater propriety, have given it the name of the latter city, if determined to withhold the courtesy of acknowledging the title to which it lays claim. The writer wishes it to be observed that, in the present communication, his remarks are confined exclusively to points which concern the merits of the Pharmacopœia; on another occasion he may discuss the question of its authority.

Before proceeding to the consideration of the remarks upon particular preparations, it may be proper to notice certain indirect criticisms upon the general execution of the work. The circumstance that alterations in the phraseology, nomenclature, and processes of the original Pharmacopœia are frequently introduced into the revised edition, appears to be a source of great discomfort to the editor of the Dispensatory. We find constantly recurring allusions to this circumstance, emphasised by notes of admiration, sometimes one, sometimes two or more, according to the degree of wonder the change may be supposed to have excited in the mind of the author. Sometimes the effect of this criticism by punctuation is increased by the parenthetical introduction of such phrases as the following: "the *Phil. Pharm.* has, *as usual*, modified," &c. with one point of admiration! "*According to custom*, the *Phil. Pharm.* has altered," &c. with two points of admiration!! "*A most admirable and simplified appellation*,"



&c. with three points!!! “The *Phil. Pharm.* contrary to its usual custom,” &c. with a single point! Now it is exceedingly difficult to answer this novel mode of annotation. The vagueness of the criticism affords no tangible object, and to endeavour to seize it is like grasping at a shadow. Still it is apparently the intention of all this contrivance to fix upon the revisers of the Pharmacopœia the charge of wanton trifling, of change for the love of change, without any adequate motive, and thus to depreciate the value of their labours. This then is the charge which it is deemed proper to meet. Had the author well considered the causes of the alterations to which he alludes? Did he recollect that even in his own estimation the original Pharmacopœia was far from perfect; and was improvement to be expected without change? Before indulging in this peculiar strain of animadversion, it would have been well had he perused the preface to the last edition of the Pharmacopœia, and, if not satisfied with the reasons there given for the course pursued, candidly stated his objections at once, and left the public to decide. In the opinion of the revisers, the work would have been imperfect without these alterations. The original edition was made up of portions taken from different Pharmacopœias, without any modification so as to make them harmonize, and fit well together as parts of one whole. To give unity to the work, it was necessary to reduce the discordant materials into order; and, a certain system having been adopted as the basis, every particular name and formula was made to conform with this system. It is obvious that in this process of consolidation, numerous changes were requisite, which, considered separately, might not seem to have been called for. The materials of an edifice may be severally well shaped, but if they do not fit accurately together, it will be necessary to remodel them, or the building would be awkward and unsafe. Besides, there were many errors of phraseology in the old work which required correction; and one source of numerous changes in the revision, was a mistake which had been inadvertently commit-

ted by the original framers of the Pharmacopœia, in converting the weights of the Edinburgh Pharmacopœia into the measures of their own. Other causes of change were the propriety of carrying into complete operation the system of nomenclature originally adopted, but not fully acted on in the first edition, and the absolute necessity of modifying certain names, so as to bring them into accordance with the present condition of chemical knowledge. Any one who will read with due attention the introduction to the last edition of the Pharmacopœia, and judge of any alterations which he may find by the principles there laid down, will not, in all probability be disposed to complain that they have been inconsiderately or wantonly made.

We now come to the more definite instances of criticism. The first is contained in the following paragraph, which relates to strong Acetic Acid.

“The *Phil. Pharm.* has the Dublin name and the same preparation, except that it employs acetat of *soda* instead of acetat of *potash*, which, although an alteration, is no improvement, since potash may be had where soda is unattainable. The proportions of the Dublin College are six ounces of the salt, and three ounces of sulphuric acid, which are followed by the *Phil. Pharm.* only in double amount.” P. 12.

Passing over the inaccuracy in relation to the proportions employed by the Dublin College, which, according to the last edition of its Pharmacopœia are 100 parts of salt to 52 parts of acid, I cannot admit that soda is unattainable by any physician or apothecary in the United States. But the Pharmacopœia contemplates, that the acetate of soda will be procured from the chemical manufacturers, who can prepare it in quantities sufficient to meet any demand which may arise. In France and England, it is very largely prepared from pyroligneous acid by saturating this with lime, and decomposing the acetate of lime by sulphate of soda. Thus procured, it is much employed in the preparation of acetic acid, and at much less expense than

would be incurred by the use of acetate of potassa. Another advantage of the salt of soda is that its crystals are permanent in the air, while acetate of potassa is deliquescent. The former, therefore, always yields a definite product; the latter, if particular care be not taken, may at one time yield a stronger acid than at another. The process of the United States Pharmacopœia was tried experimentally before it was adopted.

On the subject of the Black Drop, the *acetum opii* of the old Pharmacopœia, the author observes:

“That of *Phil.* has rejected it, under the impression that it is ‘unscientific in the directions, and uncertain in the result, and has been rendered unnecessary by the introduction of the acetate of morphia, and acetated tincture of opium;’ all which is probably more a matter of opinion than of fact.” P. 16.

How it is possible for any one to read the process, and not admit its uncertainty and want of science I cannot conceive. Certain quantities of opium, vinegar, nutmeg, and saffron are first directed to be taken and *boiled to a proper consistence*. Now is it possible for all persons to agree upon what is the proper consistence; and will not one almost necessarily boil more than another, and thus obtain a different result? Next, after the addition of sugar and yeast, the mixture is ordered to be digested for seven weeks, and placed in the open air until it becomes a syrup. Is the point at which a liquid becomes a syrup so obvious that no diversity of opinion can exist on the subject; and will different operators suspend the process at precisely the same moment of time, so that in every case the same amount of spontaneous evaporation shall occur? Again, is it scientific to boil the nutmeg when we well know that its virtues are dissipated by decoction? Independently of all this reasoning, it is notorious, among practical men, that the black drop is of uncertain strength, so much so that some consider it as possessing three times, others only twice the strength of laudanum. As its chief peculiarity is the substitution of an acetate for the natural meconate of morphia, the same end is obtained by the use of the separated acetate, or,

at any rate, of the acetated tincture, which contains all the active ingredients of opium; and these two preparations are now rapidly displacing the black drop. Indeed, the author seems to have changed his own opinion very shortly after penning the remarks which I have just quoted; for, on the next page but one, he refers for "some *good observations* on the subject of the black drop" to a paper by Thomas Evans in the second number of the first series of this Journal, of which paper the whole scope is to prove, that the black drop is unworthy of being considered officinal, and that an acetated tincture, such as has been introduced into the Pharmacopœia, should be substituted in its place.

The next criticism is on the subject of Rectified Ether. Appended to the process for this preparation is the following note.

"The *Pharm. of Phil.* orders these twelve ounces of ether, thus rectified, to be shaken with nine ounces of distilled water, from which, when the water subsides, the ether is to be poured and preserved. May we ask what is the object of this, and has the loss been taken into account of the ether that is dissolved by the water? And what can the water possibly remove that the solution of potash has not already done?"

In reply it is only necessary to observe, that the ether, as distilled from the solution of potassa, still contains a considerable proportion of alcohol, from which the operation in question is intended in some measure to free it. The following quotation from Turner's Chemistry bears upon the subject. "Ether combines with alcohol in every proportion, but is very sparingly soluble in water. When agitated with that fluid, the greater part separates on standing, a small quantity being retained, which imparts an ethereal odour to the water. *The ether so washed is very pure, because the water retains the alcohol with which it is mixed.*" The author of the criticism had only to open a work on chemistry to obtain an answer to his question. But whatever may be thought of the value of the direction, the London College should at least



share the credit or blame with the Washington convention; for the process of the United States Pharmacopœia is in all respects identical with theirs, and was, in fact, copied from it. The process for rectified ether given in the "American Dispensatory," was taken from a former edition of the London Pharmacopœia, before the direction for washing with water was introduced. Had the author consulted the last edition of that work, it may be a question whether, instead of the queries by which he insinuates a charge of ignorance against the convention, we should not have been presented with the very same direction, as an addition to the process which he has himself selected.

In relation to the Carbonate of Ammonia of the Pharmacopœia, the author observes: "As this salt possesses alkaline properties, it can scarcely be called carbonat; and it is rather surprising, that a term, which in the first edition of the Pharmacopœia, was deemed deserving of correction, conformably to all the three British colleges, should now be here revived!" P. 54. This criticism savours of the old school. Since the recent developments of the laws of chemical combination, the old nomenclature of salts, founded on an excess of acid or base as indicated by the predominance of its properties, has begun to be considered unphilosophical; and terms have been adopted which express the relative proportions of acid and base in equivalents. According to this system, the salt in question is a sesqui-carbonate of ammonia, consisting of three equivalents of acid and two of base. But a precise conformity with chemical nomenclature is not demanded in pharmaceutic titles, and as only one compound of carbonic acid and ammonia is employed in medicine in this country, there is no danger of confusion by designating it as the *carbonate of ammonia*; and the term in itself is preferable either to the sesqui-carbonate or subcarbonate, on account of its comparative brevity. The same plan has been adopted in other cases, and the change in this particular instance was in accordance with a general system of nomenclature. The name adopted by the Dublin

College in the last revision of their Pharmacopœia is the same with ours; so that in quoting this college as authority for the term "subcarbonate of ammonia," the author is himself in error.

The editor of the Dispensatory is not content with the process for Antimonial Wine. This subject has been fully considered in a previous communication; and the reader is referred to Vol. III. p. 201 of this Journal, for an account of the considerations which induced the convention to adopt the present formula, and which, in the opinion of the writer, justify the change. In relation to this process, I shall quote but a single sentence from the Dispensatory. "These remarks apply to the *Phil. Pharm.* whose prescription is a scruple of tartar emetic to ten ounces of wine, (P what kind?) whilst the *N. York Pharm.* retains, &c." P. 90. The author might have saved himself the trouble of asking what kind of wine was directed, if he had consulted the *Materia Medica* of the Pharmacopœia, in which "the white wine called Teneriffe" is expressly designated as the variety to be employed in all the processes in which wine is directed in that work.

In the preparation of the Nitrate of Silver, the Pharmacopœia directs one ounce of the metal and five fluidrachms of nitric acid. In relation to this the editor observes: "The *Pharm. Phil.* says five fluid drachms. This quantity is scarcely adequate to dissolve one ounce of the metal." Dr A. T. Thomson, in the London Dispensatory, states that "ten fluidrachms are amply sufficient for the solution of two ounces of silver;" and the acid to which he alludes has precisely the strength of that of the United States Pharmacopœia. The Dublin College at present directs 37 parts of silver to 60 of dilute nitric acid. The dilute nitric acid of this College has the sp. gr. 1.280, and consequently contains about 48 parts of strong nitric acid of the sp. gr. 1.5, in the hundred. [See *Ure's table.*] As the acid of the United States Pharmacopœia is of the sp. gr. 1.5, it follows that 48 parts of it are contained in 100 of the Dublin dilute acid, or 28.8 in 60 parts,

so that the proportions of the Dublin College are 37 parts of silver to 28.8 of our nitric acid, or, in troy ounces, 1 to .7784. As a fluidounce of nitric acid (sp. gr. 1.5) weighs 1.424 troy ounces, it follows that .7784 troy ounces are equivalent to about four and a half fluidrachms, so that this is the quantity of the nitric acid of the United States Pharmacopœia directed by the Dublin Collège to dissolve an ounce of silver, considerably less than the quantity which the author of the Dispensatory pronounces to be insufficient. We are assured that, in the revision of the Dublin Pharmacopœia, care was taken to test the accuracy of the altered formulæ by actual experiment; and the probability is that they are generally correct. For their proportion of nitric acid, therefore, the convention have the authority of Dr Thomson and of the Dublin College; and a calculation founded on the combining numbers of the acid and metal, will lead to the same result.

The next remark which appears to merit particular attention, relates to Benzoic Acid. After copying the process of a former edition of the Dublin Pharmacopœia, the author goes on to say: "In this formula the *U. S.* and *N. York Pharm.* coincide. That of *Phil.* scarcely differs from it, except in verbal alterations, which rather obscure the process." P. 147. Now here is a grave charge. The convention is accused of altering a process, obviously for the mere purpose of change, and of having rendered it more obscure by the alteration. But what is the real state of the case? The process of the United States Pharmacopœia of 1820 was taken from the Dublin process of that time; but in the revision it was not considered sufficiently definite, and that of the London College was adopted in its place. The present process, therefore, so far from being a mere verbal change of the Dublin, is almost verbatim that of the London College; and the abandonment of the former process seems to be justified by the example of the Dublin College itself, which, long before the publication of the late edition of the American Dispensatory, had adopted a formula entirely different in all its steps from the one quoted, on its authority,

in that work. Writers generally admit, that the process which has been adopted in the United States Pharmacopœia from that of London, yields a larger product than the mode by precipitation; and though it is not so chemically pure, yet it is not on this account the less useful in a medical point of view, its fragrant odour, and, to a certain extent, its operation as a medicine, depending on the oleaginous matter mingled with the acid.

In allusion to Storax, the author observes: "The *Phil. Pharm.* has admitted this article, unduly, we think. The *N. York Pharm.* has omitted it. The former also directs its purification as below, *distilling off* the alcohol with a gentle heat; a very useless direction, to say the least." P. 148. The reason for admitting storax into the Pharmacopœia was, that it was a constituent of the compound tincture of benzoin, a preparation generally kept in the shops, and in considerable repute as a stimulant expectorant, and local application to indolent ulcers. If admitted into the Pharmacopœia, it was necessary that a process should be given for its purification, as in its ordinary state it is unfit for use. The process for purifying it consists in dissolving it in alcohol, then straining, and distilling off this liquid. But the author seems to have some objection to the distillation, which he considers useless, "to say the least;" in other words, it may, in his opinion, be injurious. It would have been satisfactory to have learned from him what injury could be incurred, as neither the London College, which gives the same direction, nor the Washington Convention, had any conception of the possibility of such a result. They even thought it might be advantageous to preserve the alcohol, as nothing rises from the storax which could contaminate this liquid at the temperature requisite for its distillation; and it is highly probable that the apothecary, unless better informed, may be of the same opinion.

Speaking of the process for procuring Muriate of Baryta from the carbonate, the author observes: "Why this was preferred to the sulphat we know not; certainly the carbonat of ba-



rytes is not so readily found in our shops for this purpose! It may be doubted if it could be had if wanted." P. 149. For the information of the author, it may be proper to state, both that the carbonate of baryta can be obtained in the shops, and that it was preferred to the sulphate for the preparation of the muriate, in consequence of the infinitely greater facility and simplicity of the process, which much more than outweigh any difference in the original cost of the article, at least on the small scale in which the muriate is prepared in the shops. Indeed, the author, on the following page, seems to have become of the same opinion; for he states, that "when the carbonat cannot be procured, the sulphat is employed to prepare the muriat, as follows;" that is, the sulphate is to be resorted to only when the carbonate is not to be had; and as there is not at present any absolute want of the latter salt, he will admit the propriety of the preference given to it in the Pharmacopœia.

The United States Pharmacopœia directs distilled water in the preparation of the "Liquor Calcis." The editor of the Dispensatory thinks this "might reasonably be supplied by the hydrant or rain water." P. 163. Were the Pharmacopœia intended exclusively for Philadelphia, it is undoubtedly true that the hydrant water might have been substituted for distilled water in the process; but the former is not to be obtained everywhere throughout the Union; and rain water, which is also proposed as a substitute, is apt to be contaminated with impurities from roofs, &c. and in dry weather is not always at the command of the apothecary. The common pump water, as found in many places, would be an altogether unfit ingredient of a preparation, one of the most common and useful applications of which is to allay irritability of stomach. Under these circumstances the convention can hardly be blamed for adopting distilled water as the solvent, especially as the greatest possible injury that can result is a little additional trouble.

The reintroduction of the Pulp of Cassia into the Confection

of Senna is deemed by the author "an *useless* change!" But when it is considered that this is, after senna, the most active ingredient, and certainly plays an important part in that modification which the senna undergoes in the preparation, the change may not be thought deserving of the character ascribed to it. In adopting the confection of senna of the London College, the framers of the first edition of the United States Pharmacopœia, unadvisedly, I think, omitted the cassia pulp, probably on the ground that it was not kept in our shops; but this objection to it is not valid, as our communication with the West Indies is so easy, that nothing more than a demand is necessary to lead to an abundant supply; and, in fact, since the publication of the Pharmacopœia, the cassia pods have once more made their appearance in the market.

On the subject of the Compound Confection of Catechu, consisting essentially of catechu, kino, opium and aromatics, the following remark is made. "The *Pharm. U. S.* and that of *Phil.* have not thought proper to employ it. It is, however, so good an article, that we are glad to find it introduced into the *N. York. Pharm.* under the name of Confectio Catechu." P. 250. The trouble of a reply to this criticism is spared us by the author himself in the very next page, where he observes: "With respect to the class of medicines now under notice, it may be affirmed, the smaller the number, the more perfect the Pharmacopœia." Again, "We must regret that the whole body of confections, conserves, and electuaries had not been rejected in toto!" The convention, though not prepared to go all lengths with the author, have acted in the spirit of his recommendation so far as they thought consistent with the interests of the profession; and, not finding the confection of catechu in the work, did not consider it as presenting claims sufficient to authorise its admission. It is, in fact, composed of ingredients which we are in the habit of associating in various proportions, according to the particular circumstances of each case; and it is, therefore, a more proper object for extemporaneous prescription, than for officinal direction.

I shall close these observations, for the present, by explaining one other error into which the editor of the Dispensatory has fallen, in relation to a process of the United States Pharmacopœia. After quoting a formula for the preparation of Compound Extract of Colocynth, as that of the London College, though it certainly is not the one at present recognised by that college, he proceeds as follows. “The *Pharm. Phil.* has a formula substantially the same, except that the amount of ingredients is increased to ounces. It has also added soap, but which of the two kinds mentioned in their list, is not stated. What the particular object of the soap may be in this preparation, we confess we cannot very well discern!” Now the fact is, that the process of the United States Pharmacopœia is in reality, what that given by Dr Coxe professes to be, the process of the London College. This College is responsible both for the increase of the proportions and the addition of soap; and, though the revisers of our own Pharmacopœia would very willingly bear the responsibility, they would be unwilling to assume the credit of the change, at least any other portion of it than what may be due to the perception of improvements, and a willingness to adopt them. In the preparation of an extract, so complex and so much used as that under consideration, the propriety of making it on a large scale is too obvious to require comment. The addition of soap may serve the double purpose of giving a more suitable consistence to the mass, and of qualifying the action of the aloes, so as to render it less disposed to produce irritation of the rectum. The author is mistaken in stating that the kind of soap employed is not designated. In the *Materia Medica* list two kinds are indicated, one by the name of “soap,” defined to be “soap prepared from soda and olive oil;” the other “common soap,” defined “soap prepared from soda and animal oil.” In the formula for compound extract of colocynth the term “soap” is used, indicating, as plainly as words could indicate, the former variety. Is the note of admiration, with which the author closes the paragraph above quoted, intended

to express wonder at his own confessed want of discernment, or at the presumption of the convention in introducing an ingredient into one of their preparations, the use of which he could not discern?

Having followed the author so far as the "Extracts," I shall postpone any further investigation till another occasion. It may, however, be proper here to state, that I have not knowingly allowed any criticism which could bear unfavourably on the Pharmacopœia to pass unnoticed, and cannot therefore be obnoxious to the charge of shunning a full examination of any one point in relation to it. If there be errors in the work, they do not appear, so far as I have examined the Dispensatory, to have been detected. It is due to the author to state, that he has thus far, in at least two instances, given some credit to the revisers of the Pharmacopœia, viz. where he says that the dilution of carbonate of ammonia "has been with great propriety omitted in the *Phil. Pharm.*" P. 55; and that "the *Phil. Pharm.* very properly rejects that preparation [the process of Mr Phillips for preparing tartar emetic], and employs the above [the process for preparing the oxide of antimony from the muriate or chloride] as the first step in the process." P. 85. These instances of commendation, and they are the only ones which have particularly struck my attention, are here cited to show, that the object in this communication is not to do injustice to the editor of the Dispensatory, but purely to counteract unfavourable impressions in relation to the Pharmacopœia which his mistaken criticisms, if not corrected, might be apt to produce.

[To be continued.]



ARTICLE XVI.—*On Arsenic.* By J. K. Mitchell, M.D.  
and Elias Durand, M.P.

As a poison and a medicine, arsenic is a substance of considerable importance. Not unfrequently applied to the treatment of diseases, and too often used for the destruction of individuals, this metal has been a subject of much scientific investigation. But, as we shall see in the course of this memoir, although the knowledge which we possess concerning it has been sanctioned by authority and declared under frequent attestation in courts of law, yet there is perhaps no part of science less entitled to our credence or respect. The detection of some errors which have the countenance of high and almost universal authority, led us to investigate in detail the most important characters of arsenic.

The specific gravity of regulus of arsenic is, according to Bergman, Thenard and Henry, 8.31, and that weight is sanctioned by Paris and Fonblanque. Brandt, followed by Christison, makes it 8.308. Lavoisier found it *when melted?* 5.7633; Harepath, 5.672; Berzelius, 5.7; Guibourt, 5.959; Turner, 5.8843; and Thomson, when sublimed, 5.235. We obtained *by sublimation* in a clear glass tube a ring of arsenic of very remarkable brilliancy. From that ring was removed the upper part, which looked duller, and then by a very delicate hydrostatic balance we found the specific gravity to be 5.767. The number given by Lavoisier and Berzelius is that which approaches therefore most closely to the truth.

The specific gravity of the white oxide (arsenious acid) is subject to nearly equal variety of statement. According to Bergman it weighs, when vitrified, 5.000, while Dr Wollaston makes it in that state 3.699, and R. Phillips, 3.715. In its ordinary state it is 3.706 (Bergman), or 3.729 (Harepath), or 3.260 (R. Phillips). By very carefully conducted examination we fix the specific gravity of compact opaque arsenious acid at 3.656, and that of the transparent variety at from 3.208

to 3.333; and no specimen weighed more than 3.4. When it cracks, as it does in its progress to a perfectly opaque condition, its specific gravity must necessarily vary with every specimen. Dr Wollaston's number for the vitrified specimens, represents nearly also the sp. gr. of compact opaque arsenic as we found it.

The metal itself has been *universally* represented as the most volatile of metals. Bergman, Thenard and Berzelius fix its subliming heat at or about  $324^{\circ}$  F.; Christison at  $356^{\circ}$ ; and Paris and Fonblanque  $540^{\circ}$ . In a criticism on the work of Paris and Fonblanque, in the Edin. Med. and Surg. Journ. the writer observes that "all the best modern authorities state it to be only  $356^{\circ}$  F.; and no chemist, so far as we know, has fixed it higher than  $388^{\circ}$ ."\*

The vaporising temperature of white oxide, stated by Thomson, Bergman and Christison at from  $351^{\circ}$  to  $383^{\circ}$ , is fixed by Berzelius and Thenard at or near incipient red heat. Generally the first authorities consider the metal as more volatile than the arsenious acid.

Having observed that the metallic arsenic always occupied the part of the glass tube nearest to the flame, while the arsenious acid formed during the process of reduction, or which escaped unaltered, concreted on a part considerably higher up, we naturally inferred that metallic arsenic is less volatile than arsenious acid. To satisfy ourselves we performed the following experiments.

Into two tubes, *open at one end* and sealed and blown into a bulb at the other, were put equal quantities of metallic arsenic and white oxide respectively. These bulbs, and that of a good Fahrenheit's thermometer, were immersed in cold linseed oil, so as not to touch the bottom of the vessel, and a spirit lamp being placed beneath, heat was gradually applied. At  $425^{\circ}$ , by two experiments, the arsenious acid became visible on the sides of the tubes at a point about one-fourth of an inch above the surface of the oil. In the tube containing the metal

\* In the Dic. de Chimie of Klaproth and Wolff, it is said to be volatile in close vessels at  $540^{\circ}$  F.

the quantity of oxide seemed much smaller than in the other. At  $560^{\circ}$ , no metallic arsenic or black oxide being visible, the process was closed, on account of the insufferable fumes from the oil.

Mercury being substituted for the oil, other similarly prepared tubes were immersed in it, heat applied, and the same results obtained.

Mercury being made to boil briskly, the bulb of a thin glass tube containing bright arsenic was suddenly immersed in it, with the effect of producing a little sublimed arsenious acid; *but no metal was sublimed.*

Into zinc just fused was plunged a similar tube, with the effect of producing some arsenious acid and an umber ring; but no bright arsenic was sublimed.

As the zinc declined in temperature, and was just about to lose its fluidity, two other tubes containing arsenic were plunged into it. Neither sub-oxide nor metal was elevated, but as usual some crystals of white oxide were observed.

Into a glass tube, partially imbedded in a crucible full of sand, and heated to visible redness, was dropt a small piece of bright arsenic just *at the moment* when, in the dark, the imbedded part of the tube ceased to be luminous. No metal was sublimed.

The same experiment being in progress, the metal was thrown in, while the redness at the bottom of the tube was distinctly visible in the dark. A very little metal sublimed.

These experiments conclusively demonstrate that the temperature at which arsenic is volatilized, is a *red heat visible in the dark*, a degree of heat nearly twice as great as has been supposed by the author who rates it the highest. They also show that the point of sublimation of arsenious acid, is higher than stated in most treatises, but not nearly so high as indicated by Berzelius and Thenard, and greatly below the subliming temperature of the metal itself.

The taste of arsenious acid is said by Bergman to be acid subdulcid. Hahneman, Dr James Gordon and Walker think it sweet. Addington and Christison esteem it insipid; while

Zacchius, Orfila, Berzelius, Foderé, &c. declare it to be sharp and acrid. In truth, when in a strong hot solution, the taste is, as described by Navier, rough, while in powder or in the common cold solutions, it excites a sensation on very delicate palates only, and that is too feeble to be distinct or susceptible of description. When most perceptible, it is most nearly like that produced by sulphate of zinc.

The odour of garlic or the arsenical odour was formerly ascribed to the arsenious acid, but is now universally attributed to the vapour of the uncombined metal. As the odour can be perceived when arsenic is placed on the surface of boiling mercury, a temperature at which no metal is volatilized, and as the unreduced white arsenic is entirely inodorous, we are left at some loss to detect the cause of the odour. But as the temperature is about that at which is formed the brown oxide (suboxide of Berzelius), the odour may *by inference* be attributed to that; so that on this point, also, both the older and more recent writers are probably in error.

The solubility of arsenious acid is a point not uninteresting both to the physician and toxicologist, but it is particularly recommended to the attention of the pharmacopolist because of the peculiarities attending it. Klaproth and Bucholz found that 1000 parts of temperate water take up two and a-half parts, while 1000 parts of boiling water dissolve 77.75 parts or one 13th, and retain on cooling 30 parts or one 33d of their weight. Fischer of Breslau totally denies the solubility of white arsenic, while Guibourt pretends to have discovered that vitrified or transparent arsenic is less soluble than the opaque varieties. He dissolved in 1000 parts of temperate water 9.6 parts of transparent, and 12.5 of opaque arsenic, while, when boiled, the same quantity of water dissolved 97 parts of the first, and 115 of the second, retaining at 60° F. 18 of the one and 29 of the other. To settle this point we made the following experiments.

*Cold Solutions.*—1. Levigated opaque arsenic in water at 60° F. for half an hour; filtered and ascertained the specific gravity of the liquid to be 1001 grains, water being 1000 grains at 60° in the same bottle.



2. Repeated—result 1001.
3. Repeated with recent transparent variety—result 1008½?
4. Repeated with opaque variety—result 1001¾.
5. A perfectly transparent specimen levigated, left for 48 hours and occasionally agitated, had after filtration a sp. gr. of 1012¼ grains, and yielded when evaporated to dryness 15¼ grains of white arsenic.
6. Treated an opaque variety in same way for 24 hours—result 1009; this was in a wide shallow dish.
7. Treated same kind for some time in same way in a tall narrow phial, which was often shaken—result 1006.

The solution No. 7 was subsequently thrown on powdered arsenious acid in a wide dish and left for 48 hours—result 1011½.

*Remarks.*—The effect of time on the action of the solvent is worthy of notice, as it may be found hereafter to affect other solutions in the same unlooked for manner. We perceive in the above experiments no confirmation of the assertions of Guibourt, for we discover a greater rapidity and equal extent of solubility in the transparent variety when placed in similar circumstances. The shape of the vessel appears also to exert some influence.

*Hot Solutions.*—1. Powder of compact opaque arsenious acid of sp. gr. 3.656, was subjected to water in active ebullition for two hours, when the sp. gr. while hot was found to be 1015¼ grains; water of same bulk and temperature being 967 grains.

2. Same quantity of a much finer and older powder subjected to exactly the same treatment—result 1033.

3. Same treatment with powdered compact opaque variety for four hours—result 1049½.

4. Same treatment with the same kind for four hours, filtered while hot, and reduced until the sp. gr. was 1062. As this solution contained about the quantity of arsenic in Guibourt's strongest solution, it was left in a temperature of 60° for 48 hours, when its sp. gr. had become 1021½.

5. A boiling solution of sp. gr. 1042, reduced rapidly to 60° F. filtered and weighed—result, at 60°, 1029½.

6. A solution reduced by boiling until deposits began, and allowed to cool and left for 16 hours—result, at 60°, 1033. Actual weight of arsenic in the cold solution was found by evaporation to be 39 grains.

7. Seven drachms of finely powdered old opaque arsenic were boiled in water for five hours, the liquid being filtered was reduced to one half, at which time a pellicle began to form, and the temperature rose to 216° F. Sp. gr. while hot 1076½. That weight was then transferred to an evaporating dish, carefully evaporated, and 138¼ grains of white arsenic obtained. 1000 grains of water of same temperature would therefore dissolve 147.6 of arsenic.

8. By exactly the same procedure with a compact semi-transparent variety, the sp. gr. bottle held of the hot liquid 1077 grains, which yielded on evaporation 139¾ grains. 1000 grains would therefore hold in solution 148 grains.

*Remarks.*—The power of the solvent in a given time, depends rather on the fineness of the powder than the variety from which obtained. A truly saturated boiling solution holds about 15 per cent, or nearly 1 to 6.75. But such a solution does not seem attainable by mere ebullition without evaporation, which will account for the discordancy in the statements of authors on this subject.

The maximum power of water at 60° F. is the dissolution by 1000 grains of about 16 grains of the arsenious acid, though water at 60° is capable of holding about 40 grains; but the amount deposited during refrigeration depends so much on time and some unknown agents as to constantly vary the results.

#### TABLE OF COMPARISON.

<i>Hitherto stated by authors.</i>	<i>Now stated.</i>
Sp. gr. of metal from 5.235 to 8.31, of white arsenic from 3.260 to 5.000,	5.767. 3.656.
Temperature at which the } metal rises, } 324° to 540° F.	{ Red heat visible in the dark.
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<i>Hitherto stated by authors.</i>		<i>Now stated.</i>
Temp. at which white arsenic rises,	} From 351° to low red heat	{ 425° Fahr.
Taste of white arsenic—acid, insipid, sweet, acid, rough.		{ Tasteless in mass, scarcely tasted in powder or cold solution; austere in strong hot solution. Neither sweet nor sour in any case.
The alliaceous odour comes from white oxide only— from metal only.		{ Probably only from sub-oxide.
Solubility of arsenious acid,	{ Cold, 2½ parts in 1000. No solubility. 9.6 and 12.5 in 1000 according to variety.	{ From 12 to 16 grains in 1000, without distinction of variety.
Solubility of arsenious acid,	{ Hot, 1000 dissolve 77.75, or 97 to 115, and retain on cooling 30, or from 18 to 29, according to specimen.	{ 1000 grs. of boiling water will hold when saturated 148 grains of white arsenic, and retain from 25 to 40 on cooling, being affected by time, &c. and not by variety.

[To be continued.]

ARTICLE XVII.—*On Certain Compounds of Carburetted Hydrogen.* By Daniel B. Smith.

It is often serviceable to the cause of science to bring together facts of the same general character, even where no new discovery or investigation is attempted. Analogies are often thus suggested, to guide the experimenter or the theorist; for we do not always perceive the resemblance which isolated facts bear to each other, or the importance of the class to which they belong, without this sort of aid. It is therefore hoped, that a view of the part which the carburet of hydrogen plays in chemical combination, will not be altogether useless.

There are two combinations of carbon and hydrogen identical in their proportions, yet having different properties. The first, which is the olefant gas of the Dutch chemists (the di-

hydric carburet of Berzelius), contains two volumes of gaseous carbon, and two of hydrogen gas condensed into one; and consists of two proportionals of carbon, and two proportionals of hydrogen, its atomic weight being 14. Its specific gravity is .9722 (.9852 according to Saussure), it is not acted upon by any of the acids, and is a permanently elastic fluid.

The second, which was discovered by Faraday, and is the tetarto-carbo-hydrogen of Dr Thomson, contains four volumes of gaseous carbon, and four volumes of hydrogen gas condensed into one, and consists of four proportionals of each; its atomic weight being 28. Its specific gravity is 1.944; water absorbs it sparingly; alcohol takes it up in large quantities, and sulphuric acid absorbs more than 100 times its volume of the vapour. On being cooled to zero it becomes a liquid, having the specific gravity of .627. This remarkable difference is, no doubt, owing to a different arrangement of particles; the integrant molecules of the former being each composed of four simple atoms arranged round each other, and those of the latter of eight, having also a peculiar arrangement. It is probable, that in the nascent state these compounds are readily substituted for each other.

These sub-species or varieties of carburetted hydrogen, may be regarded as bases, forming by their combinations with other substances a very peculiar and strongly marked class of compounds. The first combination is the hydrate of di-hydrocarbon, formed of one equivalent of olefiant gas, and one of water. This neutral compound is *alcohol*.

The second is the hydrate of tetarto-hydro-carbon, formed of one equivalent of Faraday's carburet, and one of water. This compound is the hydric ether, which is known by the name of sulphuric, phosphoric or arsenical ether, according as it has been prepared with those acids respectively.

This hydric ether is usually considered as the type of its class, and its properties are too familiar to need description.

Carburetted hydrogen combines with the acidifying principles chlorine, bromine, iodine, and with cyanogen, forming



with them ethers which may be classed together as the second division of the order.

*Chloride of Hydro-carbon.*—The character of this species of ether is involved in some confusion, as the accounts of different authors are somewhat at variance. Three varieties have been described, which a more close examination will probably reduce to a single species. Analogy would lead us to anticipate that this will prove to be a chloride of tetarto-hydro-carbon. The first species is formed of one volume of chlorine and one of olefiant gas, and is the ether discovered by the Dutch chemists, and termed “la liqueur des Hollandais” by French writers. It is a compound of one atom of each of its elements, and its atomic number is 50. It is a colourless volatile liquid of a peculiar sweetish taste and ethereal odour. Its specific gravity is 1.2201. It boils at 152° F. and may be distilled without change.

When a stream of chlorine is passed through alcohol or sulphuric ether till these liquids are saturated, a peculiar ether is formed, having, according to Vogel, a specific gravity of 1.134. It is a colourless, thin, oily looking fluid, more volatile than water, smelling somewhat like nitrous ether, and having a hot, aromatic and somewhat bitter taste. It is scarcely soluble in water, but dissolves in alcohol and sulphuric ether in all proportions. Depretz considers it as composed of one volume of chlorine and two of olefiant gas. It is probably a mixture of chloric and hydro-chloric ethers.

A third species of chloric ether is formed by distilling alcohol from chloride of lime. It resembles the first species, but has been analysed by its discoverer Soubeiran, who has ascertained it to be a compound of two proportions of chlorine, two of hydrogen, and one of carbon: or two atoms of chlorine and one of bi-hydroguret of carbon. A self-taught American chemist\* on the shores of Lake Erie, has the credit of first insulating this very curious and interesting species of ether.

\* See several communications on the subject of this ether in 21st and 22d vols. of Silliman's Journal, by S. Guthrie of Sacketts Harbour.

Soubeiran obtained it by distilling one part of alcohol at  $33^{\circ}$  with thirty-two parts of liquid chloride of lime, made of one part of solid chloride to five of water. The receiver was surrounded by cold water, and the retort heated till the liquid began to boil. The fire was then removed, and the distillation continued of itself until no more ether passed over. By repeated washings and distillations (the last one from muriate of lime), the ether was obtained in a highly concentrated state. This liquid, as obtained by Soubeiran, was heavier than water. It boils at  $190^{\circ}$ , is colourless and very limpid, has a very sweet and penetrating odour, and a hot, aromatic, saccharine taste. Its vapour when breathed excites a decided sensation of sweetness in the fauces. It is slightly soluble in water, to which it communicates a saccharine taste. Alcohol unites with it in all proportions, and forms, when sufficiently diluted, a very agreeable aromatic and saccharine liquor.

It remained in contact with a solution of nitrate of silver for a month, without decomposition. Neither sulphuric, nitric, nor hydro-chloric acids act upon it. When mixed with alcohol and a concentrated solution of potassa, and slightly heated, a rapid decomposition ensues; chloride of potassium is formed, and a volatile oily liquid separates, having a yellow colour and the smell of cummin. While Soubeiran was making these researches in Europe, the subject was engaging the attention, in a ruder manner to be sure, of Guthrie in this country.

He obtained an ethereal spirit by mixing three pounds of chloride of lime and two gallons of alcohol, sp. gr. .844, in a retort, and distilling about one gallon. By redistilling this product in a glass retort, from a great excess of chloride a highly concentrated ether was obtained, weighing 1.44. When the final rectification of the ether was performed, by distilling it from strong sulphuric acid, it was obtained of the sp. gr. of 1.486. In this state it boils at  $166^{\circ}$ , is extremely volatile at  $60^{\circ}$ , and diffuses upon the tongue and fauces a powerful ethereal odour, and excites to an intense degree its peculiar scent and aromatic taste. The action of sulphuric

acid upon the alcoholic solution is peculiar; it diffuses itself through and blackens the whole mass, and generates sulphuric ether after the chloric ether has distilled over. If no alcohol be present, the transparency of the liquid is not affected.

The action of this ether upon the living system is interesting, and may hereafter render it an object of importance in commerce. Its flavour is delicious, and its intoxicating qualities equal to, or surpassing those of alcohol. It is a strong diffusible stimulus, similar to the hydrated ether, but more grateful to the taste.

*Bromide of Hydro-carbon. Bromic Ether.*—This ether is colourless, transparent, heavier than water, has a strong ethereal smell, a sharp taste, and is very volatile. It is soluble in alcohol, from which it is precipitated by water.

*Iodide of Hydro-carbon. Iodic Ether.*—Iodic ether is perfectly neutral. Its odour is strong, and though peculiar, is analogous to that of other ethers. Its sp. gr. at  $72^{\circ}$  is 1.9206. It boils at  $148\frac{1}{2}^{\circ}$ . It is not inflammable, but merely gives out purple vapours when put upon burning coals.

*Sulpho-cyanide of Hydro-carbon. Sulpho-cyanic Ether.*—This ether is an oily fluid, heavier than water. It has a strong smell of assafoetida or cochlearia officinalis, a sweetish taste, and leaves an impression of peppermint in the mouth. It is very soluble in alcohol and hydric ether. It burns readily and gives out fumes of sulphurous acid. It begins to boil at  $151^{\circ}$ , but the boiling point rises to  $161^{\circ}$ . Potassium preserves its lustre in it for some time.

A third class of ethers is formed by the union of hydro-carbon with an acid. These combinations are perfectly neutral, and have all the characters of genuine ethers. The neutrality of their elements is, however, easily disturbed.

*Hydro-chlorate of Hydro-carbon. Hydro-chloric or Muriatic Ether.*—Muriatic ether is a colourless gas, having a strong ethereal smell and a sweetish taste. It is perfectly neutral; its sp. gr. is 2.219. At the temperature of  $52^{\circ}$  it condenses into a colourless liquid ether, the sp. gr. of which

is .874. It is more volatile than even the hydric ether. It exhibits no acid properties, and burns readily with a green coloured flame. It is composed of two volumes of olefiant gas, and one of hydro-chloric acid condensed into two volumes. It contains no water.

*Sulphate of Hydro-carbon. Sulphuric Ether. Oil of Wine.*—There can be no doubt, that the liquid known by the name of oil of wine, is a genuine ether of this class. The pre-occupation of the name sulphuric ether, by a substance in no way entitled to it, is probably the reason why it has not hitherto been so classed. The circumstance is an illustration of the effects of a false nomenclature in obstructing the progress of science.

Oil of wine has been proved to be a compound of two atoms of sulphuric acid and two atoms of tetarto-hydro-carbon. It is an oily liquid of a light amber colour, a fragrant smell, a bitterish, pungent taste, and a sp. gr. of 1.06. It does not mix with ether, but combines with alcohol and produces no change on vegetable blues.

*Hydrated Hypo-nitrite of Hydro-carbon. Nitrous Ether.*—This ether is a compound of one atom of tetarto-hydro-carbon, one of hypo-nitrous acid, and one of water. It has a pale straw colour, a strong peculiar ethereal odour and sweet taste, and is more volatile than hydric ether. Its sp. gr. is .85, that of its vapour 2.627. It dissolves in forty-eight parts of water, communicating an odour like that of apples. It is perfectly neutral, dissolves in alcohol in every proportion, and burns with a brilliant white flame.

*Hydrated Oxalate of Hydro-carbon. Oxalic Ether.*—This ether is composed of one atom of tetarto-hydro-carbon, one of oxalic acid, and one of water. Its sp. gr. is 1.0929, and that of its vapour 5.087. It is an oleaginous liquid, having an aromatic smell, somewhat analogous to that of garlic or phosphorus. It boils at 263°.

*Hydrated Acetate of Hydro-carbon. Acetic Ether.*—This ether is composed of one atom of acid, one of tetarto-hydro-



carbon, and one of water. It is a limpid, colourless fluid, with a pleasant ethereal odour. It does not redden vegetable blues. Its specific gravity is .882, and its boiling point  $165^{\circ}$ . It is soluble in hydric ether and alcohol. It burns with a yellowish white flame, and dissolves in seven parts of water at  $62^{\circ}$ .

*Hydrated Benzoate of Hydro-carbon. Benzoic Ether.*—This ether is composed of one atom of tetarto-hydro-carbon, one of acid, and one of water. It is a colourless oily looking fluid, with a pungent taste and a weak smell, somewhat resembling benzoic acid. Its sp. gr. is 1.0539, and its boiling point  $408^{\circ}$ .

The following ethers have not been subjected to analysis, but there is every reason to suppose that their composition is similar to that of the other acid ethers.

*Formic Ether.*—This ether is a colourless fluid, having a strong smell of peach kernels. Its sp. gr. is .9157, and its boiling point  $133^{\circ}$ . It burns with a bluish white flame, dissolves readily in alcohol, and in nine parts of water at  $55^{\circ}$ .

*Tartaric Ether, Citric Ether, Kinic Ether, and Malic Ether.*—These ethers have not been obtained pure, and little is known of their properties. They appear to be neutral compounds of their respective acids with the hydro-carbon as a base. They are destitute of smell and volatility, are heavier than water, and very soluble in alcohol.

Farther researches will probably extend this class of compounds, which is marked by characters as peculiar as those belonging to the acids, the alkalies, the salts, or any other of the great divisions into which compounded bodies may be thrown.

There is another substance, the properties of which are so strongly marked, that if its composition were unknown, we should not hesitate to rank it among the ethers as one of the best defined of the class. I mean the *bi-sulphuret of carbon*. This is a transparent, colourless liquid, with an acid, pungent, and somewhat aromatic taste, and a very fetid odour. It is exceedingly volatile; its sp. gr. is 1.272, and its boiling point

110°. It burns with a pale blue flame, dissolves readily in alcohol and ether, and is insoluble in water.

Is this analogy sufficiently strong to warrant the conjecture, that sulphur is a compound of hydrogen and an unknown radical, and that the "alcohol of sulphur" is a true ether, composed of this radical and hydro-carbon?

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ARTICLE XVIII.—*Pharmaceutical Notices*, No. 4.

*Morphia.* Twelve pounds of opium were digested in six gallons of clean rain water for three days, when two quarts of yeast were added, and the whole subjected to the heat of a stove 90° F. for seven days; the mixture was turbid, and after vainly endeavouring to filter it, I was obliged to clarify it with the whites of eggs, employed as in the manufacture of syrup; by this means I obtained a clear solution. The colouring matter was precipitated in the usual way, by very cautiously dropping dilute ammonia into the solution, as long as a blackish brown precipitate was thrown down, and when the colour changed to a light fawn colour, the solution was filtered and precipitated by ammonia in excess, giving a precipitate which was but slightly coloured. The solution was then saturated with sulphuric acid, evaporated to one half, and again precipitated by ammonia, added, as at first, very cautiously, so, as at first, to throw down the colouring matter, then filtered and again precipitated by ammonia; this process was continued as long as a drop of the decanted solution, when evaporated to dryness on a piece of glass, was reddened on the addition of nitric acid. The precipitates were dissolved in dilute sulphuric acid, and the solution filtered through depurated animal charcoal, (prepared by dissolving the phosphate of lime in bone-black by muriatic acid, calcining the residuary charcoal with potassa

and washing the product, until the washings no longer precipitated muriate of platinum), and carefully evaporated, when beautifully crystallized sulphate of morphia was formed at two successive times, after which the mother liquor became coloured, and was consequently acidulated with sulphuric acid, and again filtered through charcoal, evaporated and crystallized. I obtained from 12 pounds of opium, 11 ounces 124 grains of sulphate of morphia. I have never failed in obtaining, in the small way, 40 grains of pure morphia from 500 grains of opium; but when I have operated on pounds, I have never obtained more than two-thirds that proportion; this I conceive to arise from the fact, that an ounce of opium cannot be obtained, that will be a fair representative of a few pounds of the same parcel.

*Iodides of Mercury.* The remark made by the editor of the Journal of the Philadelphia College of Pharmacy, although supported by the authority of Dumas, is, in my opinion, not the less incorrect, and I will prove it from Dumas himself. In Vol. III. pages 618, 619, paragraph 2250, this author observes: "Red *Iodide*. This remarkable compound may be obtained, in a direct manner, by triturating mercury with an excess of iodine, and washing the mass *with alcohol* to remove the uncombined iodine." Again (page 619), he says: "the red iodide is soluble in alcohol." Now it is evident that there must be an error somewhere; for if alcohol is to be used to remove the uncombined iodine, the inference must be, that this fluid will not act on the iodide of mercury. Now I find that alcohol at 0.822 does not dissolve any one of the iodides of mercury, and that heating the red iodide converts it into a red and yellow sublimate, the yellow being pressed turns red, and being heated with alcohol is again changed to a yellow: what is the legitimate deduction? that the yellow and red iodides are identical. Dumas also describes a green iodide of mercury, which, when sublimed, will form both the yellow and red iodides, and by trituration will form the red only; it is merely necessary to heat the yellow, when, without loss of

weight, it will become red. Thomson, in his last work, has two iodides which he quotes from Gay Lussac, but without telling us where this author states it as a fact. Dumas has evidently some hypothetical notions on this subject, for he says, in the precipitation of the iodides of mercury, that the precipitate is green when the salt is neuter, that it is yellow when the salt is somewhat acid, that when there is more acid present it is red, and when this is in excess, both uncombined iodine and the red iodide appear together. I may ask why I cannot dissolve the red iodide from the yellow by alcohol at 0.822.\*

*Indelible Ink.* The solution of nitrate of silver is sometimes accidentally spilled upon linen, &c. and but few persons are capable of removing the stain. The following process will always succeed. Take three tumblers: into one of which are to be put muriatic and nitric acids in the proportion of one part of the former to one half of the latter and four parts water; the second tumbler is to contain dilute aqueous ammonia; and the third pure water. The stained spot is to be im-

\* Our ingenious correspondent has certainly made a good defence of his original supposition, and has exposed a discrepancy in the account given by Dumas of the effects of alcohol on the red iodide; at the same time, he has failed in convincing us of the identity of the different iodides. Berzelius, than whom there can be no higher authority, admits three of these compounds, *iodure mercurieux* (green iodide, D.); *iodure susmercurieux* (yellow iodide, D.); and *iodure mercurique* (red iodide, D.). Of the latter, he says: "this is precipitated in the form of a scarlet powder, when a solution of iodide of potassium is mixed with a mercurial salt; it is readily fused, and then becomes yellow; it sublimes in rhomboidal laminæ, which are at first yellow, and become red on cooling. If a tolerably large quantity be sublimed, pretty large groups of crystals will be obtained of a sulphur yellow colour, which, according to Hayes, do not change colour from the action of the air, even when exposed to the solar rays; but, if they be scratched with a fine point, or forcibly compressed, they become red, the change beginning at the spot acted upon, and soon extending to every portion of the crystals. The *iodure mercurique* is soluble in alcohol and the acids, especially by the aid of heat, and crystallizes on the cooling of the solution." From the mode pursued by our correspondent, it is likely that the compound he obtained was the iodide of mercury (green iodide), as this is the method advised by Berthemot for its preparation. This iodide becomes red by the effects of heat, and is insoluble in alcohol.—ED.



mersed in the acid mixture for a few seconds, and then rinsed in the water, afterwards dipped in the alkaline solution and then in the water, and so on successively until the object is attained; about two immersions as above will remove the deepest stain of what is generally termed *indelible ink*.

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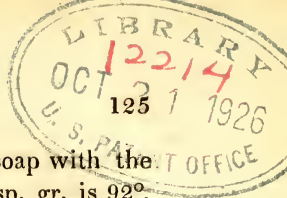
ARTICLE XIX.—*Observations upon the Ol. Euphorbiæ lathyris.* By Jos. Scattergood.

The *Euphorbia lathyris* is a monoecious plant indigenous to France. It is commonly known by the name of Caper Spurge and Mole Plant, it being supposed that no moles disturb the ground where it grows. Although not a native of this country; according to Barton, it is sometimes met with in this neighbourhood in situations where it has the appearance of growing wild. It is easily cultivated, and in some parts of New Jersey, where it has been introduced, is found in abundance.

Like all the Euphorbiaceæ, it contains a milky acrid caustic juice. It is stated in the “Manual of Materia Medica and Pharmacy,” by Edwards and Vauvasseur, translated by Durand and Togno, that the country people in France have been for a long time in the habit of using the fresh leaves and roots of the plant, in order to obtain copious alvine evacuations. The seeds or beans are emetic and cathartic, in doses of from two to eight grains. They weigh, when decorticated, from two to three grains.

The oil obtained from them, which in France is called Catapucia oil (*Oleum Catapuciæ Minoris*) resembles in colour the *Ol. Ricini*; it is, however, less dense; has no odour when freshly prepared, and no perceptible taste. It is soluble in

- On *Ol. Euphorbiæ Lathyris*.



sulphuric ether; insoluble in alcohol; forms a soap with the alkalies; and burns with a fine white flame; its sp. gr. is 92°. The process by which Thomas Bellangee, of Crosswicks, New Jersey, (the only manufacturer of it in the United States) obtains it, is precisely similar to that used in obtaining the *Ol. Ricini*. It yields about fifty per cent.

Dr Charles Calderini first obtained and used it. It is stated, on his and Dr Frank's authority, that its effects are sure and prompt. "We ought," says the Italian author, "to consider it as a very mild purgative; it does not produce vomiting, nor colic, nor tenesmus; it may even be administered in dysenteries, where there is intestinal irritation, with as much advantage as the pulp of tamarinds."

It is well known that soil and situation exercise a material influence upon the medicinal properties of plants, and it may possibly be owing to this cause that the oil obtained from the beans grown in this country, does not possess the mild properties attributed to the European article.

Doses of six, eight, ten and twelve drops were given to several individuals, with a view of producing cathartic effects; and, although administered in conjunction with aromatic oils, and in one or two cases with an alkali in the form of soap, it invariably produced excessive nausea, and even vomiting. In some instances, it did not produce alvine evacuations, and in others, both vomiting and purging ensued. In all of these cases the whole dose was administered at once. I have been informed by the manufacturer, that when administered in small quantities, and repeated at intervals of half an hour or an hour, it operates on the bowels freely as a cathartic, without producing much nausea. It is, however, to be feared, that without some method can be devised, by which its nauseating property may be avoided, this disagreeable effect will prove an insuperable objection to its general use, at least as a cathartic.

A few weeks since, I found about half an ounce of a crystalline matter in the bottle in which about four pounds of the oil had been kept for five or six months. The form of the crystals

could not be satisfactorily ascertained. When freed from the oil, which was readily done by treating them with cold sulphuric ether, they were white, slightly soluble in cold, but very soluble in boiling ether. Cold alcohol does not dissolve them: they are soluble in boiling alcohol, but not so much so as in ether. From both these they are precipitated, upon cooling, in acicular crystals. They have little or no taste or smell. When exposed to heat, they melt; the fluid resulting, resembles the oil: if the heat is not too great, a crystalline mass is formed on its cooling. It imparts a slight milkiness to water when boiled with it. Nitric or muriatic acids have no effect upon it, either hot or cold. It dissolves in sulphuric acid, producing a bright red solution, which, after standing some time, changes to black. Its action upon the system, so far as could be ascertained, appeared to be similar to that of the oil, although in one or two cases it exhibited symptoms of more virulence. The experiments on this point, however, were, for want of proper subjects, far from being satisfactory.

My efforts to obtain this resinous substance directly from the seeds, have proved ineffectual, although several methods were tried.

The medicinal virtues of the plants of the family to which this belongs, are extremely interesting; and it is to be hoped professional men and others will embrace every opportunity to develope and render them useful.

## SELECTED ARTICLES.

ARTICLE XX.—*New Experiments on Bitter Almonds and their Essential Oil. By MM. Robiquet and Boutron Charlard.*

[Concluded from page 75.]

After having executed this preliminary examination, which was only meant to afford some definite data, we returned to our principal object, which was the study of the essential oil; but not being willing to operate on any but very pure products, we were obliged to occupy ourselves with the means of readily obtaining this oil; now it is well known that nothing is more difficult with the ordinary apparatus, because powdered almonds mixed with water form so thick a paste, and the liquid becomes so viscous, that it is almost impossible to subject it to ebullition for a few minutes, without its puffing up or adhering to the sides of the vessel, and consequently being decomposed. Among the various means to which we had recourse, we found the employment of steam the most advantageous.\* If, in fact, we divide the products obtained by this

\* We constructed a particular apparatus, composed

1. Of a steam boiler.
2. Of an ordinary still, the cucurbit of which is furnished towards its inferior part, and at some distance from the bottom, with a thick tube forming a cross, which is perforated at its superior surface with a great number of small holes. This tube is closed at three of its extremities, and its fourth traverses the sides of the cucurbit, and is adapted to the boiler.



means, it will be found, that the first contains more oil, and that the supernatant liquid is limpid; while at a more advanced part of the distillation, the oil is in less proportion, and nevertheless the liquid becomes very milky; finally, no more oil is obtained, and the liquid again becomes clear. If we examine those three successive products, we find that they have not any action, on either blue or red test paper.

M. Vogel was therefore in error in stating that the distilled water of bitter almonds was acid; it does not manifest this character, except when it has undergone some alteration. The odour of the first products is so strong and penetrating, that it resembles rather that of cyanogen than the mild smell of hydro-cyanic acid; and what is more remarkable, is, that if we make a comparative examination of the three products, by the salts of iron, we recognize, not only that the cyanic compound contained in this water diminishes as the distillation advances, but that this compound, whatever it may be, must rather contain cyanogen than hydro-cyanic acid, since the precipitates we obtained, even with the per-salts of iron, are

3. At the opposite side and at the lowest part of the cucurbit, is a cock, for the purpose of drawing off the condensed water.

4. The water bath of this still, instead of having close sides, as usual, is to be constructed of tinned brass wire, connected by several bands of copper, also tinned.

5. The head and worm are to be constructed in the ordinary manner.

The furnace and boiler are to be placed at a proper distance from the alembic, and the boiler filled with water, the two parts connected together, and the boiler heated; powdered almonds are now to be mixed with a sufficient quantity of water to form a paste. To render this paste less compact, several handfuls of finely cut straw are to be added to it, and the whole divided into small masses about the size of a walnut, which are to be gradually thrown into the water bath. Care must be taken to place a wooden cylinder perpendicularly in the centre of the vessel, which is to be removed when it is filled, by which means a chimney is formed, which permits the vapour to penetrate through the whole of the contents of the vessel.

Finally, the still is to be adapted and all the joinings luted. It is best, particularly in winter, to cover the still with several folds of linen, in order to prevent too quick a condensation. All being thus disposed, the fire is to be increased under the boiler in order to bring the water to ebullition.

at first of a reddish yellow, and it is only after exposing them to air, that they become green, and finally blue.

It is to be understood, that we do not speak of the colour of the precipitates at the moment they are formed by an alkali, but only after they have been re-dissolved by an excess of hydro-chloric acid.

There is also another observation to be made, which is, that if we mix nearly equal parts of the milky distilled water with that which is transparent, the whole becomes limpid. There is then in the first product, a substance which contributes to the solubility of the essential oil, and as the first product contains more of the cyanic compound we have mentioned, this property is probably owing to it. What is certain, is, that the transparent water contains much more essential oil than the milky water which comes over afterwards; and in so great quantity, that by rectifying it, we nearly double the product.\*

M. Vogel has advised the employment of barytes water, to facilitate the extraction of the oil of bitter almonds, and it may be presumed, that he was led to this idea, by the persuasion that the distilled water was acid; but it is important to know, that in thus having recourse to alkalies, we withdraw the cyanic compound which we have mentioned, and consequently the essential oil no longer possesses its primitive properties, particularly those relative to its action on the animal economy.

Moreover, the abstraction of this cyanic compound much diminishes the proportion of oil. It is therefore most advantageous to follow the process we have indicated; nevertheless, it might perhaps be useful under some circumstances to rectify this oil over an alkali, and especially when it is intended to

\* This observation has induced us to adopt the following method. When we have collected a sufficient quantity of the distilled water and essential oil, we mix the whole in the body of a still, and separate in a few minutes by distillation all the essential oil, for it is so volatile, that it immediately leaves the water, and passes over with the first ounces of the product. It would therefore be useless to continue the operation, for what afterwards comes over, does not contain any additional quantity. By proceeding thus we obtained nearly one eightieth of essential oil.

use it as an aromatic, as then it would offer less danger in its employment. This observation is the more opportune at the present time, as there is a great consumption of this oil for such purposes, as it is a perfume which has become very fashionable, particularly for fancy soaps.

Once acquainted with a good process for preparing this oil, and certain of obtaining it perfectly pure, we again undertook its study under another point of view. Having previously satisfied ourselves that when recent it was perfectly neutral, we applied ourselves particularly to investigating whether benzoic acid primarily existed in it, or if it only contained its elements. We flatter ourselves in being able to throw some light on this interesting question, as may be seen by the following experiments.

One of the means which appeared to us the best adapted for obtaining the proposed object, was to determine whether the oxygenation of the essence caused an augmentation or a loss of weight in the solid residue, for as nothing but benzoic acid is obtained after the oxygenation, one of two things must take place, either this oxygenation converts the whole of the oil into benzoic acid, or it sets this acid free, by transforming the body that saturated it into volatile substances which are dissipated. This experiment, which appears to be very simple, nevertheless presents great difficulties, from the volatility of both the essential oil and of the acid it developes. Whenever, in fact, this essence comes in contact with air or oxygen in close vessels, the interior of the vessel becomes covered with small crystals of benzoic acid, some of which are fixed by one of their extremities, and when detached form small brilliant scales, whilst others are grouped in such a manner as form a kind of crystalline covering or crust, which cannot be detached without occasioning a considerable loss. Thus, it is altogether impossible to give credit to the results that may be obtained by this method. We were, nevertheless, able in a great measure to obviate these fallacies, by putting the oil into a small phial with a flat bottom, and a long straight neck, and placing this

small vessel, after having ascertained its exact weight, under a receiver filled with oxygen, over mercury. By this procedure we obtained a slight augmentation of weight; but we tried this experiment but once, and dare not vouch for its accuracy.

Little satisfied with this result, we had recourse to dry chlorine, thinking, that if the acid was already formed, it would probably be found saturated with carburetted hydrogen, and that in such case we would obtain hydro-carburet of chlorine, and the benzoic acid would be set free. We therefore then disposed an apparatus in such a manner as to cause a current of dry chlorine to pass over the surface of a certain quantity of essence that had been kept several days in a dry vacuum. We at first thought that things were going on conformably to our expectations, for we soon saw a multitude of prismatic crystals precipitated to the bottom of the fluid, and remain there during the whole of the operation, although it was continued much longer than was necessary. We took these crystals for benzoic acid, but when the experiment was finished, and the apparatus taken down, we soon recognized our error. The supernatant liquid had acquired a lemon colour, emitted very pungent vapours, which strongly irritated the eyes, and the odour of which reminded us of the compounds of chlorine and hydro-cyanic acid.

This liquid readily united with water; the mixture heated to ebullition disengaged much hydro-chloric acid, and let fall on cooling a precipitate, of beautiful lamellar crystals in long tufts, which formed at the surface of the liquid, and extended towards the bottom. These crystals, collected on a filter, afterwards dissolved in distilled water and properly purified, presented all the characters of the acid obtained by the oxidation of the oil.

On the other hand, having examined the crystals that were formed spontaneously during the action of the chlorine, we were convinced that they were not analogous to the preceding acid. In fact, those crystals, after having been successively



compressed between several thicknesses of filtering paper, emitted a sweet and peculiar odour. They apparently did not dissolve in water, even when boiling, while hot alcohol dissolved them in almost every proportion, depositing them plentifully, on cooling, in prismatic crystals of a dull white colour, with very little odour or taste; but which, exposed to a moderate heat, liquified like an oil, but did not volatilize; and when thrown on a burning coal emitted a strong smell of hawthorn. These crystals, which were perfectly neutral, appeared to us somewhat similar to those obtained by treating the essential oil with caustic potass.

We must, however, own that we have not pushed our researches very far on this subject.

This experiment appeared to us clearly to show that the benzoic acid did not pre-exist in the essential oil of bitter almonds, but that it was the product of its oxigenation. Hence, in our opinion, this essence must contain a kind of benzoic radical. This idea is in strict conformity to an opinion long since made public by one of us, as regards ethers of the second class; an opinion which consists in not admitting acids as fully formed in this sort of compounds. Moreover, as we have no intention of supporting or combating this or that opinion, but merely to seek for the truth, we have made new experiments in order to acquire more exact notions on this subject. Thus, in hopes the caustic alkalies might possibly give us some decided results, we made the following experiments, which were performed with the utmost care.

Fifteen grammes of pure caustic potassa were put into a small vial with a ground stopper, and a quantity of distilled water added, sufficient to fill the vial about two-thirds full, whose capacity was about 60 grammes. The solution being made and allowed to cool, we introduced into the same vial, by means of a very small pipette, five grammes of pure essence, which floated on the surface of the alkaline solution; afterwards we managed to fill the vial with pure water, which, as is well known, is lighter than the essence. The result was

that the latter formed an intermediate layer between the other two liquids, so that the neck was filled with pure water, as we added a sufficient quantity of it to entirely displace the air. In this state of things the stopper was introduced, displacing the necessary quantity of water, and precaution taken to fix it tightly. This done, we agitated it strongly for some minutes. The water and alkaline solution united; but on the least repose, the oil rose to the surface.

We took care to prevent the introduction of air, by inverting the bottle and placing the neck in water when we were not agitating it. After two or three days of reaction, we noticed some small shining crystals floating in the inferior liquid, and also saw that they united with the oil by agitation, but formed anew in the course of a few hours, and that in fifteen days these crystals were multiplied to such a degree that the oil had entirely lost its fluidity. This operation was continued for more than a month, the bottle being very often agitated each day; and the bottle was not opened until several days after we had observed the oil had become completely solidified.

When, finally, we wished to know the results, we poured the whole on a small filter and immediately saturated the liquid that ran from it with hydro-chloric acid. To our great astonishment, it did not produce the least deposit, and our surprise was still increased by seeing the shining crystals which remained on the filter dissolve in the water that we poured on to wash them, giving rise to a milky solution. These crystals thus formed a species of soap. The milky solution being distilled, we obtained some drops of an essence which had scarcely any odour.

This new experiment appeared to us strongly confirmatory of the preceding, as we think that every thing tends to show that if the acid had pre-existed in the seeds, we might have withdrawn it from the potassa, as happens when we treat the essence in contact with air, by the same agent, though in a much less degree of concentration, but aided, it is true, by heat. It is sufficient to boil some essence of bitter almonds for

a few moments, in contact with a solution of potassa, to obtain, at the moment of saturation, an abundant precipitate of benzoic acid.

Having been as fully convinced on this point as these kind of researches admit of, we endeavoured to discover whether other means of oxigenation would produce the same effect as those to which we had recourse; in consequence we treated some grammes of the essence with nitric acid by heat, the acid being of the usual strength. The reaction was very violent, and manifested itself by a strong disengagement of nitrous vapours. We obtained, by means of this treatment, an acid similar to the preceding, and which, when purified, represented rather more than half the weight of the essence employed.

All these facts are in accordance, and it does not seem possible, that the non-pre-existence of benzoic acid in the essential oil can be called in question.

We had arrived at this stage of our inquiries, when we became acquainted with the new researches of M. Liebig on the acid of the urine of the herbivora, and hastened to ascertain whether our acid, which was likewise derived from an azoted body, did not itself contain azote, but we found no trace of it; and besides, notwithstanding all the deference we owe to the opinions of M. Liebig, we must avow that the existence of his sulphuric acid as a body, *sui generis*, does not appear to us by any means to be yet proved. We have seen, in the course of our practice, so many of these anomalies presented by organic combinations, that we are by no means disposed to think that the benzoic acid obtained from the urine of the herbivora, is formed by the action of heat. We remain convinced, on the contrary, of its pre-existence in urine, and the interesting discovery of Fourcroy and Vauquelin seems to us to remain in full force.

M. Liebig, after having found that sulphuric and hippuric acids, heated together, gave rise to sulphurous and benzoic acids, made a deduction from this circumstance, altogether favourable to the non-pre-existence of benzoic in hippuric

acid. We own, that this demonstration does not appear to us to be very *strict*; for what must occur if an organic substance more alterable than benzoic acid, be found united with it, and we treat the mixture with sulphuric acid? Precisely what happens with the hippuric acid. Besides, it may be presumed that M. Liebig is not himself entirely convinced on this point, since he grants, in the following paragraph, that we may regard the hippuric acid as a combination of benzoic acid with an unknown organic substance; and in this we entirely agree with him. Would it not indeed be very surprising that three agents, as distinct as heat, sulphuric and nitric acids, convert the hippuric into benzoic acid, if the latter was not already found in it. Hence, the proofs adduced by M. Liebig, do not appear to us sufficient to establish that our first masters were mistaken; and he will certainly permit us to defend their rights until new experiments decide the question in a more positive manner.

*Of Amygdaline and its Properties.* After we had satisfied ourselves, by all the means in our power, that benzoic acid did not exist in a formed state in the essential oil of bitter almonds, we had not only to search for this body in the almonds themselves, but also to endeavour to discover the product that might contribute to the creation of the acid; and as, among all the products that we have obtained, none had so much attracted our attention as the white crystalline matter before-mentioned, we were naturally induced to examine it more closely, and this examination has afforded some facts which appear worthy of attention.

The following are the most important. We have already said that this remarkable substance developed at first a sweet taste, which was soon followed by a bitter one, that perfectly recalled that of bitter almonds. Now it is to be observed that this same taste is also found in the distilled water, and in the essence of bitter almonds. It was, therefore, very probable that our crystalline matter was not different in its properties, nevertheless it is entirely inodorous; it was not at all volatile,



whether alone or mixed with the different agents that would seem to have the power of developing this property if it was susceptible of it.

When heated in a small tube it swelled, giving out at first an odour of burnt sugar, but towards the end of the calcination, that of hawthorn was distinguishable. This substance appeared to be altogether unalterable in the air; it completely resisted the action of chlorine when both were dry, at least no external change was visible; but if little moisture was present, a sort of tumefaction was to be remarked, and if the residue was heated with a greater quantity of water, it remained insoluble; the whole united itself into a white dry mass, inodorous and friable like a resin. Alcohol did not dissolve any portion of it.

When this substance was heated with a solution of caustic potash, it disengaged, as we have before said, a decided and strong odour of ammonia, and the solution gave no trace of hydrocyanic acid. There was no precipitation on saturation, nor did it appear to us to form an acid by means of this reaction; nevertheless we would not venture to affirm this, and the experiment requires repetition: all that we are able to affirm is, that this substance contains nitrogen, for under the same circumstances it constantly furnished ammonia, whatever degree of purification we had submitted it to.

*Action of Nitric Acid on Amygdaline.* Nitric acid is the only agent which appears to us susceptible of establishing any relation between this substance and the essential oil of bitter almonds. In fact, like this, it furnishes, as a result of this treatment, an acid which possessed the characters of the benzoic. It is true it is obtained in a small proportion, and with more difficulty, as the nitric acid sometimes acts with so much force as to destroy the benzoic acid as it is produced; but it is certain that by taking proper precautions we may be sure of obtaining it, and that these two acids do not present any difference on a comparative examination.

By comparing all the results acquired, it will be seen that

it is impossible not to admit the great probability of the substance here mentioned powerfully contributing to the formation of the essential oil, for it may be recollected,

1. That when this substance is removed, there is no possibility of developing either odour or taste in the residue.

2. That benzoic acid does not pre-exist either in almonds or the essential oil itself.

3. That both the essential oil and our crystalline matter, treated by nitric acid, afforded benzoic acid.

It still remained to ascertain in what manner this new product assists in the formation of the essential oil, and how it acquires odour or volatility. There is certainly some unknown body contained in it that serves as a common bond, and which eludes our researches. We have fully proved that the intervention of water was indispensable; but this is not all, and it may be presumed that the substance which converts itself with so much facility and promptitude into hydrocyanic acid, is also that which, by its union, produces the odour and volatility. But what is this other substance that renders itself so manifest by its effects? This we have not yet been able to discover, and it remains for those who may be more learned and fortunate. In the mean time we shall restrict ourselves to fully proving that the substance above described is entirely distinct from all hitherto known.

Its colour, crystallization and saccharine taste at first led us to suppose that it might be mannite, and we were the more disposed to think so, as among the products we have extracted from the bitter almonds there was another saccharine matter that seemed to us to be the uncrystallizable sugar of this supposed mannite; but both these products being submitted to the action of nitric acid, behaved so differently that it was impossible to recognise any likeness. The uncrystallizable sugar furnished a great quantity of oxalic acid, whilst our substance gave none but the benzoic. Hence it certainly merits a rank among organic products. We wished to give it a name that would show the species of almonds which contained it; but as

botanists have not yet established a distinction between the trees which furnish the sweet and bitter almonds, we are induced to adopt the denomination of the genus, and shall call it *amygdaline*.

*Composition of Amygdaline.* As it was not sufficient to have recognized nitrogen in amygdaline, but was also requisite to determine the proportion of it, we begged two of our friends and colleagues, Messrs Henry, Jun. and Plisson, who have for a long time occupied themselves with the means of perfecting the elementary analysis of organic substances, to determine the proportions of this: and the following have been their results:

Carbona	58.616	or	19 atoms.
Hydrogen	7.0857	or	28 atoms.
Nitrogen	3.6288	or	1 atom.
Oxygen	30.7238	or	7 atoms.

We were much surprised to find so small a proportion of nitrogen; as the quantity of ammonia disengaged by the action of caustic potash on this substance seemed to indicate more of it. But, in fine, this analysis, although repeated several times, always furnished the same results; and the great skill that our colleagues have acquired in this kind of experiment, does not permit us to entertain the slightest doubt of their exactness. Nevertheless, with all the perfection they have been brought to, are our means of analysis sufficiently certain for us to place implicit confidence in them? Besides, is nitrogen itself sufficiently known to permit us to affirm that the properties which distinguish it are never wanting? There is also another fact fully as interesting that deserves a place here; it is that in the manufacture of benzoic acid we have often been struck with the odour of hydrocyanic acid, particularly on opening the apparatus in which the acid has been sublimed. This phenomenon is not constant, though it frequently takes place. If it now be taken into consideration that benzoic acid, under different circumstances, derives its origin from substances containing nitrogen, as the hippuric acid of M. Liebig, the essential oil

of bitter almonds, and of the cherry laurel,\* does it not seem probable that benzoic acid itself may contain it? and that if we do not find it, it is from our want of means, or from the minute quantity that it presents.

Finally, we are far from wishing to give more importance to these conjectures than they really merit, and we only mention them here to invite the attention of those who devote themselves to these kind of researches.

*Conclusion.* In the last analysis, we think that we have sufficiently demonstrated,

1. That the volatile oil of bitter almonds does not pre-exist in the fruit, and that water is essential to its formation.

2. That benzoic acid does not pre-exist in the volatile oil, and that oxygen is indispensable for its development.

3. That there exists in bitter almonds a particular principle which contains nitrogen, that appears to be the only cause of the bitterness of the almonds; and one of the elements of the essential oil.†

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ARTICLE XXI.—*On Cajeput Oil.* By M. Guibourt.

This volatile oil is obtained by distilling the leaves of a shrub in the Molucca islands, named *caju-puti*, that is, *white tree*. It belongs to the natural order of the Myrtaceæ, and was described by Rumphius under the name of *arbor alba minor*, (*Herb. Amboy. lib. 2, cap. 26, tab. 17, fig. 1*) to distinguish it from other species which also bear the name of

\* The oil of the *laurus cerasus* and that of bitter almonds appear to be of the same nature; they possess similar properties.

† As it is probable that this substance possesses some decided medical properties, we have desired one of our most skilful practitioners to make a trial of it under this form, and we shall know the result at some future time.



*caju-puti*, but which do not furnish the oil. These different trees were united by Linnæus under the title of *Melaleuca leucadendron*; but were again separated: and at present the species under consideration is termed *M. cajuputi*, Maton or *M. minor*, Decandolle.

According to Thunberg, cajeput oil is of a grass green colour, very fluid and inflammable; of a camphoro-terebinthinate smell, disagreeable when too strongly inspired, but agreeable in small quantities. According to Rumphius, who obtained it from the leaves of the plant by fermenting, drying and afterwards macerating them in water for twelve days, the oil is clear, transparent, very volatile, having a strong smell of cardamom, but more agreeable. This resemblance of its smell to that of cardamom, is so great, that many authors previous to Rumphius were of opinion that the cajeput oil was produced by distillation from cardamom seeds, and hence some writers have termed one species of this plant *kajuput*; but there is now no doubt that the true oil of cajeput is produced by the *M. cajuputi*.

The cajeput oil has always been subject to adulteration, and Murray states in his *Apparatus*, Vol. 3, p. 325, that the beautiful green colour of this article is considered by many experimenters, as owing to the addition of a green resin, or to copper, and that this oil is also manufactured from several others of inferior value. It may readily be supposed, that now when this oil is extolled as a sovereign remedy against the cholera, our sophisticators will not be surpassed by their predecessors; hence many persons have deemed it would be useful to determine the characters of the genuine article. I have thought, that being at so great a distance from the place of its production, that it was only by the comparison of a great number of specimens, that any certainty was to be expected.

No. I.—*Cajeput oil from Amboyna*. M. Chardin Hadancourt was kind enough to divide with me a small quantity of this oil, labelled *Cajeput Oil, distilled at Amboyna from the leaves of the M. cajuputi, and brought directly from*

*thence.* This oil was very fluid, transparent, of a very light bluish green colour, of a powerful smell, resembling that of turpentine, camphor, peppermint, and rose; or rather, this smell, which is agreeable, is peculiar to the cajeput, as it was present in all the genuine specimens I examined. At 18° C. this oil was of the sp. gr. 0.916, corresponding to 23° of Baumé's areometer. It was entirely soluble in alcohol; when eight or ten drops were poured on a piece of sugar and exposed to the air for a short time, and an ounce of water poured over it; the oil rose to the surface, preserving its transparency, and without any appearance of opake matter; finally, when this oil was agitated in a glass tube, with its own volume of a solution of cyanide of potassa and iron, it lost its slight green colour, and formed a red precipitate of ferruginous copper, indicating that this colour is owing to copper.

No. II.—*Cajeput oil obtained in London in 1817, from the East India Company's warehouse, and transmitted by M. Planche.* This oil, like the preceding, and indeed all that will be spoken of, was very fluid, perfectly transparent, and deposited no sediment in the vessel in which it was kept, and was wholly soluble in alcohol. I will not again allude to these characters, which must be present in all pure specimens of the oil.

This oil was of a tolerably dark green blue, and had precisely the same smell as the preceding; sp. gr. 0.917. After being agitated in a glass tube with half its volume of ammonia, the two fluids soon separated, and assumed their usual transparency; but the oil was deprived of all green or blue colour, assuming a yellow tint, whilst the ammonia was tinged of a pale blue or greenish; when treated by bi-cyanide of potassa and iron, it was entirely deprived of colour, and formed an abundant precipitate of a reddish purple tinge. This oil, therefore, owed the whole of its green colour to the oxide of copper, which it held in solution.

No. III.—*Cajeput oil, obtained from a druggist in Paris.*—The smell of this oil was similar to that of the pre-

ceding; it was of a beautiful deep green colour; sp. gr. 0.919 or  $22\frac{2}{3}^{\circ}$  of Baumé's areometer. Treated by ammonia, the separation of the two fluids, and the loss of colour of the oil, took place as in the preceding; except that although the original colour of the oil was at least as dark, the ammonia assumed a much lighter shade of blue, and if an equal or greater volume of the alkali was used, the whole colour disappeared.

Fourteen ounces of this oil were agitated in a bottle with about three ounces of a solution of the cyanide of potassa and iron. After remaining undisturbed for twelve hours, it was filtered, the two fluids passed through the filter with great ease, and the ferro-cupreous hydrocyanate remained on the paper. The oil was a yellow colour with a slight tinge of green, and contained no trace of copper; the alkaline ferrocyanide, on the contrary, was in great excess in the fluid. This cyanide aided the insolubility of that of the copper; for when I wished to wash the latter with distilled water, it was partly dissolved, so that I was obliged to again render it insoluble by adding the saline solution to it; I therefore limited myself to washing it with alcohol, which did not entirely deprive it of the alkaline cyanide; dried at the temperature of boiling-water, it was of a beautiful purple colour, and weighed only ten grains, making about two thirds of a grain to each ounce of the oil. In supposing that this red hydrocyanate was pure, it only represented two-ninths of a grain of metallic in each ounce of the oil, a trifling quantity when the usual doses of this medicine are taken into consideration. However, to ascertain the precise quantity of the copper, I burnt the filter, calcined the residue, removed the potash by washing with water, treated the remainder with boiling nitric acid, evaporated to dryness, and treated the saline mass with ammonia. The ammoniacal solution filtered and evaporated, gave two and one fifth grains of deutoxide of copper, corresponding to  $1\frac{3}{5}$  grain of metallic copper. This quantity of copper is so minute, that I am of opinion that the oil may be employed without subjecting it to any previous manipulation.



No. IV.—*Oil of cajeput, obtained from the same druggist, at a subsequent period.* This oil was of a deeper blue than the preceding, and more analogous to that from M. Planche. Its colour was entirely removed by the ammonia, which assumed a marked blue tint; it formed a precipitate, the alkaline ferro-cyanide; its sp. gr. was 0.913.

No. V.—*Oil of cajeput recently imported from Germany.* This oil was of a green colour, verging a little on yellow; like the preceding it contained copper; its sp. gr. was the same as No. 4. A skilful experimenter, M. Cottureau, in examining it, thought it had too strong a smell of camphor, and proposed that I should test it with sugar, a plan which he informed me was used in Germany to detect volatile oils adulterated with camphor. In fact, on this oil being tested with sugar and water, it afforded a quantity of a white opake substance, which we at first supposed to be camphor. In consequence of this, I refused the oil; but the merchant who wished to sell it, believing it genuine, added a half drachm, a drachm, and finally two drachms of camphor to an ounce of oil, similar to No. 3, and demonstrated to me that this oil, when subjected to the action of sugar and water, gave no indication of the presence of the camphor.

This experiment, hence, proves that this test is not conclusive, and renders it probable that the white substance, which separated from No. 5 was not camphor; perhaps it is natural to the oil, or produced by one of those spontaneous alterations to which the volatile oils are very subject.

I will not attempt to describe many other pretended cajeput oils which I observed in different shops, and which had been recently manufactured, possessing a strong smell of mint, rue or savin; but I cannot pass over an oil which a druggist of Paris advertised in the newspapers as having received direct from the East Indies, and stated that it was only at his shop that it was to be found in a pure state. This oil was of a bright grass-green colour, which was owing, in a great measure, to the presence of copper; but after having treated it, like the



preceding specimens, it still retained a green tinge, arising from an admixture of chlorophylline. It had a mixed smell of rosemary and rue, and must have been principally formed of the volatile oils of these two plants. Moreover, what proves that this oil was fabricated from essences of our climate, which, as is well known, are lighter than those from tropical countries, was, that its specific gravity was only 0.8945, 27° of Baumé, whilst the genuine oil varies from 0.919 to 0.916, or at most to 0.913.

To recapitulate, cajeput oil is very fluid and transparent, forms no deposit in the vessels in which it is kept, is wholly soluble in alcohol, and has a specific gravity of 0.916 to 0.919 at 18° C. It has a peculiar smell which is agreeable in a small quantity, and which resembles that of a union of turpentine, camphor, peppermint and roses. This last odour is predominant when the oil evaporates spontaneously. It is generally of a green or bluish green colour, which it owes to the presence of oxide of copper, but the quantity of this oxide requisite to produce this colour is never more than  $\frac{1}{2}$  of a grain in an ounce, and does not affect its medical properties.

It may, however, be deprived of it, without detriment, by agitating it with a solution of cyanide of potassa and iron, filtering and separating the aqueous solution. The same result is obtained by distillation, but not so effectually.

Finally, cajeput oil should have no particular smell of turpentine, camphor, pepperinint or roses; and above all, it should have no odour of rosemary, sage, savin, rue, or of any of our native essential oils.

*On the colour of Cajeput Oil.* The natural colour of cajeput oil is green; for being attached, fifteen years since, to the "central pharmacy of the hospitals," I distilled the leaves of several species of *Melaleuca*, *Metrosideros*, and *Eucalyptus*, cultivated in the garden of plants, and obtained from them all a volatile oil analogous to that of cajeput, which contained no copper, and which was of a beautiful green colour. M. Henry still possesses one of these oils, that of the *Euca-*

*lyptus robusta*, which is of a fine emerald green, and is remarkable for its mixed and delicate odour of mint and lemon. But, it is possible that the green colour of the cajeput oil may disappear in time, or that it may be destroyed by the defective plan of procuring the oil spoken of by Rumphius. Then, either accidentally from remaining in copper vessels, or intentionally by the addition of some cupreous salt, the oil assumes the green colour which distinguishes it. What makes me think that it rather arises from the first of these sources is, that spirits of turpentine become more completely coloured by contact with metallic copper, than by the addition of verdigris, which only imparts a faint tinge to it, and is partly separated by rest.

I may also remark that the green colour of the genuine cajeput oil, although owing to copper, is oftentimes deeper than would be indicated by the small quantity of copper it contains, being somewhat analogous to what takes place in the preparation of pickles, where the presence of a piece of copper during the boiling of the vinegar, and the absolutely inappreciable quantity of copper dissolved, suffice, by the combination of the metallic oxide with some vegetable principle, to produce a bright and durable green colour, and which can scarcely be deemed injurious.

*On the Specific Gravity of Volatile Oils.* Having had occasion to speak of the utility of specific gravity as a good character for the verification of cajeput oil, it may not be uninteresting to lay before our readers the following table of the density of a great number of volatile oils. I am mainly indebted for it to M. Chardin Hadancourt, who has paid great attention to this subject. It is only necessary to remark, that the majority of the results were obtained with the alkalometer of Gay Lussac, and that, from this gentleman not having stated the concordance of his instrument with the tables of specific gravities, I have been obliged to calculate these by means of Cartier's and Baumé's areometers; and in supposing with M. Gay Lussac, that the areometer of Cartier marked 10° in dis-

tilled water, and that 29° of Cartier equalled 31° of Baumé, it is certain that this double calculation may tend to create doubts as to the exactness of the results here given.

Nature of the Volatile Oil.	Name of the Ex- perimenter.	Deg. of Temp. Centig. Ther.	Centigrade Al- kalometer.	Areometer of Cartier.	Areometer of Baumé.	Pese- sel of Baumé.	Specific Gravity.
Almonds, bitter, rectified	Chardin	25				10	1.075
Aniseed	"	25	28.50	14	14.28		0.972
" East Indian, ( <i>Illicium anisatum</i> )	"	25	28.50	14	14.28		0.972
Bergamot	"	25	76.33	29	30.30		0.8675
"	Guibourt	18			30		0.879
"	Chardin	18.75	74.50	28.50	29.75		0.880
"	"	12.50	73	27.50	28.70		0.886
Cajeput from Amboyna	Guibourt	18			23		0.916
" " M. Planche	"	18			23		0.917
" green, No. 3	"	18			22.66		0.9192
" distilled, colourless	"	18			23		0.9162
" " green	"	18			22.66		0.919
" pale green, recently im- ported	"	16			22.33		0.9207
" blue, No. 4	"	18			23.66		0.913
" green, No. 5	"	18			23.66		0.913
" false	"	18			27		0.8945
Camphor, purified	Brisson	11.50					0.9887
Cinnamon	"	12.50				6	1.0439
" from Ceylon	Chardin	25				3.5	1.0255
" " China	"	25				7.5	1.0560
Caraway	"	25	62	23.25	24.15		0.910
Cedrat	"	25	83.33	33.50	35.10		0.8515
"	Guibourt	18			31		0.8709
Cedar	Chardin	25	37	16	16.40		0.959
Copaiba	"	18.75	69.33	26	27.10		0.8944
Cummin	"	18.75	54	20.50	21.20		0.928
Tarragon	"	25	50	19.25	19.90		0.9356
Lemon, not distilled	Guibourt	18			33		0.8627
" "	Chardin	25	84.33	33	34.33		0.856
" distilled	"	18	84.33	33	34.33		0.856
Fennel	"	25	69	25.75	26.80		0.896
Cloves	Brisson	12.50				5	1.0363
"	Chardin	25				8.5	1.035
Lavender	"	25	73	27.50	28.70		0.8865
"	Brisson	12.50			26		0.8938
Mace	Chardin	25	53.50	20.66	21.40		0.9266
Peppermint (English)	"	18	63	23.50	24.40		0.9086
" (French)	"	25	61	22.66	23.55		0.914
Nutmeg	"	25	57.75	21.50	22.30		0.921
Orange (Portugal)	"	25	87	34.50	36.20		0.846

Table Continued.

Nature of the Volatile Oil.	Name of the Ex- perimenter.	Deg. of Temp. Centig. Ther.	Centigrade Al- kalometer.	Areometer of Cartier.	Areometer of Baumé.	Pese- sel of Baumé.	Specific Gravity.
Orange (Seville)	Chardin	25	83.33	33.50	35.10		0.852
Pimento	"	25				6	1.044
Rosemary	"	25	69.50	26	27.10		0.8944
"	Guibourt	18			29		0.8847
Roses (Damask)	Chardin	25	78	29.75	31.10		0.8725
" (Province)	"	25	80	30.75	32.20		0.867
Yellow sandal	"	25	29	14.50	14.80		0.9684
Sassafras	"	25				11.75	1.089
Sage	Guibourt	18			22		0.9224
Turpentine	Brisson	31.66			31.66		0.8697
" rectified	Guibourt	8			31		0.8742
Thyme	"	18			27		0.8936

*Journ. de Chim. Med.*

ARTICLE XXII.—On the Gelatinous Principle of Fruits.  
By M. Henry Braconnot.

All that is known respecting the substance so long designated by the name of jelly, is merely a few uncertain facts, and in fact it may be asserted that its real nature is still unknown. Nevertheless, as it is a principle universally found in vegetables, it merits the attention of physiologists, for it appears, that it is with this substance that nature forms plants, and that after having undergone various transformations, during the period of their growth, it is kept in reserve as it were, to serve for the nutrition of new individuals of the species.

When I gave an account of the properties of pectic acid, it appeared to me that it had some analogy with the gelatinous principle of fruits. M. Vauquelin, in a memoir on pectic acid and the root of the carrot, states that he found no difference



between these two substances: this memoir, however, contains some erroneous assertions, which show that this able chemist did not himself observe all the facts mentioned in it. At the same time, it cannot be denied, that pectic acid is almost insoluble in water, whilst the mucous jelly which is not acid, is abundantly found in solution in their juices. These two bodies, therefore, are not identical.

Before commencing the consideration of the properties of the gelatinous principle of fruits, and as a preparation for that investigation, I have thought that an examination of the juice of the currant would lead to a better understanding of the subject.

*Experiments on Currant Juice.* The juice of the currant (*Ribes rubrum*) has already been examined by many chemists, among whom may be cited, Proust, John, Henry, Guibourt, Payen, Berard, &c. but these experimenters are not in unison as respects the nature of the gelatinous substance which it contains. Currants in a double linen bag were subjected to the gradual action of a press; the product was a limpid fluid which underwent the following changes with reagents.

The mineral acids, even after a long time, produced no diminution of the transparency of this juice; hence it contained neither caseum, nor the glutinous or albuminous matter, which has been gratuitously supposed to exist in all fruits. The infusion of galls likewise produced turbidness, because the peculiar azoted matter it contains forms with the tannin a combination which is very soluble in weak acids; but if the juice be previously saturated with ammonia, the tannin then produces a tolerably abundant deposit, which appears to carry with it a part of the gelatinous matter, for the superincumbent liquid is then only feebly precipitated in jelly by alcohol.

Currant juice saturated with ammonia, and left to itself for twenty-four hours, does not change its appearance. If chloride of calcium or a mineral acid be added to this solution, they produce no remarkable change, and there is no separation of jelly, an evident proof that it contains no pectic acid. But

this recent juice is very differently acted upon by the fixed alkalies and the alkaline earths. If it be saturated with potass, and an acid be added, a large, transparent and insoluble mass of pectic acid is formed.

Currant juice partially saturated by potass or its carbonate, and left to itself, soon becomes a mass of jelly, which drained on a cloth, gives out an almost colourless fluid, which is not coagulable by alcohol. This mass is pectate of potass; redissolved in warm water, it gives a very large coagulum of pectic acid on the addition of an acid; whence it appears to result, that this is the product of the slightest contact of potass or its carbonate with the gelatinous principle of fruits.

If currant juice be partially or entirely saturated with hydrate of lime, the fluid speedily assumes the form of a transparent, trembling jelly, which takes the form of its containing vessel. This jelly, which appears to be the pectate of lime, is insoluble in boiling water and ammonia, but dissolves by the aid of heat in carbonate of soda, leaving a residuum of carbonate of lime.

Currant juice saturated with carbonate of lime or carbonate of magnesia, by means of a gentle heat, assumes on cooling the form of a homogenous jelly.

Barytes water instantaneously forms with this juice a gelatinous magma of a dull white colour. The nitrate of barytes coagulates it in a short time into a mass of transparent jelly.

Surcharged by means of heat with sulphate of soda or the chloride of sodium, this juice preserves its liquid character, and on cooling, furnishes crystals of these salts, without the slightest appearance of jelly, which, as is well known, is easily obtained by this means from sugar.

The chloride of calcium, the sulphate of lime, sulphate of alumine, or silicate of potass, do not occasion any peculiar change in currant juice.

The sulphate of the peroxide of iron, also, does not produce any change, even if potass be added to the mixture. Corrosive sublimate forms a slight precipitate, which appears to be attri-

butable to the azoted matter. The nitrate of silver, and the acetate of lime convert, in time, currant juice into a jelly. The acetate of lead occasions an abundant magma, soluble in ammonia and in nitric acid. The oxalate of ammonia forms a slight deposit of oxalate of lime.

The juices of other fruits, as plums, apples and apricots, treated in the same way, afforded nearly the same results.

*Azoted matter of currant juice.* Fabroni supposed that the vegeto-animal substance found by Beccari in wheat flour, was present in all fermentable juices; but he made no decisive experiment in support of his opinion, which does not appear to me to be correct, at least as regards all fruits.

If after having precipitated the gelatinous principle of currant juice by alcohol, the alcoholic liquor be evaporated, it gives a syrupy residue which contains the azoted matter, the saccharine principle and the free acids. This residue several times treated by rectified alcohol, leaves the impure azoted matter, attracting moisture, and furnishing on combustion a large proportion of potash, and its aqueous solution produces with infusion of galls a precipitate which disappears on the addition of a little distilled vinegar.

If the syrupy fluid, diluted with water, be saturated with chalk, the animal matter mostly precipitates with the earthy salts, and the supernatant liquor containing the saccharine principle is now only slightly precipitable by tannin.

Ammonia separates this animal matter from the syrupy liquid, producing in it a soluble precipitate, soluble in the acids. This precipitate when well washed produces carbonate of ammonia on distillation, and leaves a charcoal which it is difficult to incinerate, and which furnishes an ash almost entirely formed of phosphate of lime. But this animal matter is not wholly precipitated by ammonia, for on adding infusion of galls to the neutral fluid separated from the precipitate, a second deposit is formed, which is soluble in diluted acetic acid. Fibrine macerated in this fluid, forms a union with the tannin, and by evaporation to dryness, the azoted matter was

obtained, but it appears that it was not yet exempt from impurities, and especially from acetic acid.

I will not dwell at greater length on this matter, which ought to be further examined; but must not pass over in silence a remarkable fact, which was presented to me by the syrupy fluid, deprived, as has been stated, of the gelatinous matter by alcohol. Properly diluted with water, it resembled a limpid fluid, which subjected for several days to a temperature of 20° R., underwent no fermentation; nevertheless, it appeared to contain the elements capable of producing this phenomenon, namely, azoted matter and the saccharine principle. I dissolved sugar in it, but the mixture remained perfectly quiescent. I decided on distilling this sweetened fluid into two equal parts, and added to one non-azoted gelatinous matter; fermentation then took place rapidly and afforded an intoxicating liquor, whilst the other half of the fluid, deprived of gelatinous matter, remained undisturbed. It results from this experiment, that the azoted matter of currants, deprived of the gelatinous principle, loses the faculty of exciting the fermentation of sugar, and that the re-union of these two substances is necessary to produce this action; this is the more remarkable from the gelatinous principle producing no vinous effervescence with sugar.

*Fermentation of currant juice.* To make a comparison of the principles contained in fresh currant juice with those which are separated by fermentation, I procured the juice of red currants, which came from the press quite limpid, and remained so till the fermenting process began.\* A very fine sediment was gradually deposited, which was separated by

\* According to M. Thenard, currant-juice is rendered turbid by the ferment which it holds in suspension; but this turbidness is rather owing to the fragments of the pulp of the fruit. I have, however, remarked that the juice of white currants, when fully ripe, deposited a diaphanous jelly, having the exact appearance of pectic acid, though not identical with that substance, for when dissolved in a little of the solution of ammonia, it was not precipitated by the acids.



means of a filter. The clear vinous liquid, left to itself for a few days, afforded a second and larger deposit, and having a different appearance from the first; both being well washed, they were separately examined.

The first of these precipitates, on being distilled, afforded a large quantity of carbonate of ammonia and the hydro-sulphate of the same alkali. In its moist state it is insoluble in water, in the acids, and was scarcely dissolved by the caustic alkalies. It, moreover, presented all the properties attributed to ferment by M. Thenard. If this animal matter be compared with that of wine lees, marked differences are observable, for the latter is readily soluble in the weakest alkalies, which is not the case with the former. I supposed that this difference might arise from a larger proportion of phosphate of lime in the ferment of currants, as it afforded a sixth of its weight of this salt on combustion; but having separated it, by means of hydro-chloric acid, the residue was not dissolved by the alkalies in any greater proportion. Moreover, M. Gay-Lussac had already shown that ferment is not an identical substance.

The second precipitate formed in currant-juice, was not in as divided a state as the former. It had a gelatinous appearance, and even after being washed several times, still reddened litmus paper. Boiled in water, nothing was taken up by this fluid, and it did not gelatinise on cooling. Treated with water sharpened with ammonia, it was almost wholly dissolved, and the addition of lime water separated a considerable quantity of pectate of lime. On distillation, it furnished a less ammoniacal product than the first precipitate, and the carbonaceous residue, on being burnt, left a white cinder, almost entirely composed of phosphate of lime. It therefore appears that this second precipitate was mostly formed of pectic acid, united to azoted matter, similar to that first separated during the fermentation of the juice. But this latter, after having given rise to the two insoluble precipitates spoken of above, still contained azoted matter, which appeared to be identical with that con-

tained in the recent juice; for, like it, when saturated with ammonia, it was precipitated by infusion of galls.

I thought that I remarked more of the azoted matter in the fermented currant-juice than in that which had been recently expressed, but additional observations are requisite to support or invalidate this opinion. This recalls to my mind the hypothesis of M. Astier, that *ferment is a living matter formed of animalcules, and which he supposes to be the instruments made use of by nature to effect the decomposition of sugar*. What appears certain, is, that fermented currant-juice has no action on sugar, and yet, if it be exposed to the air, it gradually alters and becomes covered with a white pelticle, which is renewed as often as it is removed. This appears to be analogous to the organized production, or to use the expression of M. Bory de St Vincent, an *attempt at existence*, which is often met with on the surface of wine during its fermentation, and which has received the name of *mother*. But if this production be collected and mixed with sugar and water, it causes a fermentation as readily as the best ferment. Moreover, I am satisfied that this latter, like alcohol and carbonic acid, is a product of fermentation, which also appears to entirely destroy the gelatinous principle, by transforming it in part into pectic acid.

*Examination of the Properties of the Gelatinous principle of Fruits.* The existence of a gelatinous matter in fruits has been known for a long time, but there is much variance of opinion as to its properties. Vauquelin, who met with it in the cassia and the tamarind, was latterly of opinion, that it did not differ from pectic acid. John, on the contrary, supposed it identical with bassorine. M. Guibourt has given the name of grossuline to a product which he obtained from the fermented currant-juice;\* but as it is manifestly the result of an alteration, we need not be surprised at its slight resemblance to the principle under consideration.

\* Journal de Chim. Med. No. 1.

The gelatinous principle may be separated from all fruits by means of alcohol, which precipitates it in the form of a jelly. Thus obtained from fresh currant-juice, it is in inconsiderable quantity, if it is wished to preserve the alcohol; but, by permitting the mixture to remain undisturbed for one or two days, all the mucous matter coagulates into a mass of trembling jelly, which it is only requisite to compress gradually, and to wash well with weak alcohol, to have the gelatinous principle in a sufficient state of purity.

When dry, it is in membranous fragments which are semi-transparent and resemble fish-glue. In this state, if it be plunged into about 100 times its weight of cold water, it swells very much, like bassorine, and finally is completely dissolved, giving rise to a mass of homogeneous jelly, having the appearance of starch, but not affording any blue reaction with iodine, and sufficiently consistent to adhere together on reversing the vessel. By augmenting the quantity of cold water, and after a slight action, the solution presents a thick mucilaginous consistence, analogous to animal mucus, and its slightly opaline appearance seemed to be owing to the presence of a small quantity of fatty matter.

Boiling water appeared to have less action on this dried matter than cold; it was also soluble to a certain degree in very diluted boiling alcohol, although it is precipitated in a jelly by this fluid when cold. The mucous or gelatinous principle of fruits well purified by alcohol, is tasteless and insipid, and does not redden vegetable blues. It is by no means as adhesive as gum arabic. Its solution in water undergoes a change on the addition of acids or ammonia; but one of the most striking properties of this body, is that of being wholly and instantaneously changed into pectic acid on the addition of the slightest trace of a fixed alkali, or of an alkaline earthy base. If any one of the acids be added to an aqueous solution of this mucous body, no effect whatever is produced. A slight excess of potash or soda will likewise induce no apparent change, although in fact a very remarkable one does occur, for on

afterwards adding an acid to this combination, it will be coagulated into a single transparent mass of pectic acid.

If, instead of adding a slight excess of potassa or soda to the aqueous solution of the gelatinous principle, it be added in greater excess, then all the mucous matter is immediately precipitated in the form of an alkaline sub-pectate. The carbonate of potassa also transforms this substance into pectic acid; but neither carbonate of soda, nor concentrated ammonia, have this property. Lime water in excess precipitates the whole of the mucous matter in insoluble gelatinous flakes, which, washed with acidulated water, and then treated with boiling water, are partly dissolved; and the addition of a small quantity of ammonia completes the solution. On afterwards adding an acid to this mixture, a gelatinous precipitate is formed, whence it appears that lime water may also, at least in part, convert the gelatinous principle into pectic acid.

If to the solution of the gelatinous principle of fruits be added a small quantity of ammonia, and afterwards chloride of calcium, a mucilaginous precipitate is formed, which disappears on the addition of a diluted acid.

Water of barytes precipitates the whole of the solution of the mucous substance in the form of an abundant jelly of pectate of barytes. The nitrate of barytes also produces as much jelly as the preceding, but this differs in being wholly soluble in diluted nitric acid. The mucous solution, when boiled with caustic magnesia, is not coagulated; but, on evaporating to dryness, and treating the residue with hydrochloric acid, a gelatinous matter remains, which is pectic acid. The gelatinous principle of fruits is not precipitated by the chloride of calcium, the acetate of lime, the sulphate of lime, the acid carbonate of lime, or the sulphate of alumine; nor by the chlorides of mercury, of platina or tin, nitrate of silver, silicate of potassa, sulphate of zinc, acetate of manganese, chromate of potassa, or tartar emetic; but it is precipitated in gelatinous masses soluble in diluted nitric acid by the soluble salts of barytes and strontian, acetate of lead, nitrate of copper, nitrates of mer-



cury, sulphate of nickel, or the hydrochlorate of cobalt. Sulphate of the peroxide of iron, and sulphate of glucinia, also produce masses of jelly, soluble in a small excess of the precipitant; no effect is induced by the infusion of galls.

This gelatinous principle, as well as the azoted matter of currants, cannot separately cause the fermentation of sugar, but this phenomenon occurs if they be united. On dissolving sugar in a solution of the gelatinous principle, an imperfect jelly results which finally becomes stringy. On distillation, the gelatinous principle furnishes, without melting, an empyreumatic oil, and an acid product, strongly reddening litmus paper, and in which I was unable to recognize the presence of ammonia. A large proportion of charcoal remains, which leaves, on combustion, a yellowish ash, formed of carbonate of lime, sulphate of lime, oxide of iron, and phosphate of lime.

Treated by nitric acid, it furnishes, like pectic acid and most of the gums, mucic and oxalic acid, and very slight traces of the yellow bitter. Hydro-chloric acid, heated with a solution of this mucous matter, causes a reaction which changes the mixture to a beautiful red colour, and forms a flaky matter of the same colour, insoluble in ammonia.

From the above-mentioned properties, it is evident that the gelatinous mucilage of fruits ought not to be confounded with any other substance, and therefore requires to be designated by a specific name; that of vegetable jelly or gelatine will not do, as it has been applied by Berzelius to an azoted substance of a very different nature; as that under consideration, in its different combinations, appears in the form of a gelatinous coagulum, and which, moreover, can be readily transformed into pectic acid, I propose to call it *Pectine*. I have ascertained its existence in plums, apples, apricots, and other fruits; but after its desiccation, it sometimes requires an immersion in water for some days to dissolve it, which is an indication of impurity.

The mucilage of flaxseed, and that of gum tragacanth, do not present the properties which characterize the pectine. As

under the influence of potash or lime, this substance is so readily transformed into pectic acid, it might be supposed that this latter is oftentimes a product of the operation; but it will not be doubted that it also exists wholly formed in many parts of plants, for according to the judicious observation of Vauquelin, the development of the vegetable acids is principally caused, in a great number of cases, by the presence of alkalies. Moreover, I have already noticed the existence of pectate of lime in some barks, and on subjecting the *Ballota nigra* to some experiments, it furnished me with a large quantity of pectate of potash.\*

I have every reason to believe, that pectine does not sensibly differ from the gelatinous mucilage which exudes between the bark and woody fibre, or the cambium of Duhamel, a primary substance, in which the first lineaments of vegetable organization are developed.—*Annales de Chimie*, July 1831.

\* The *Ballota nigra* (Black hoarhound) grows abundantly on road sides; it is extremely bitter, nevertheless it does appear in our vegetable materia medica; although the inhabitants of Gothland, it is said, make use of it as a panacea in all their diseases. This plant afforded me, on analysis, a very bitter substance, destructible by heat; pectate of potassa in large proportions; malate of potassa; chloride of potassium; sulphate of potassa; a resinous matter; and phosphate of magnesia and lime. This result must not be considered as an exact analysis, for my only intention in the examination was to discover an anti-febrile substance, analogous to salicine. As to the latter, I may observe in passing, that it appears to me better to employ in fevers a simple decoction of the barks which contain it, than the salt itself, as we are then sure of always having it unadulterated, and besides these barks also contain a small quantity of an astringent and febrifuge tonic principle, which aids the action of the salicine.

ARTICLE XXIII.—*On the Different Species of Gums.* By M. Guerin.

[Extract.]

Among those chemists who have studied the gums, we find that Fourcroy, Vauquelin and Thomson, alone, have paid special attention to them. Other chemists have made detached experiments on some of them, but no one has given a general account of them. M. Guerin has endeavoured to fill this blank. Not satisfied with the classifications and divisions of gums given by Fourcroy and Thomson, he devoted several years to a study of these bodies. The classification of the immediate principles into different genera, being much less important than a proper division of the species, one or more of their chemical properties may be arbitrarily assumed as a generic type. Nevertheless, the properties which appear to be of most importance, are those which appertain to the transformation of different species into identical products. Thus, those of the genus sugar are its conversion into alcohol by fermentation, and into oxalic acid by means of nitric acid. The type of the genus *gum* is its conversion into mucic acid, a character which must be confined to such substances as are liable to be confounded with gum arabic. As regards the determination of species, a different course must be pursued; recourse must here be had to the nature and the proportion and arrangement of elements, before deciding that an immediate principle is peculiar to this or that species.

To simplify his investigations, M. Guerin divides gums into two classes, which he terms,

1. *Arabine*. Soluble in water, so named by M. Chevreul.
2. *Bassorine*. Insoluble in water, discovered by M. Vauquelin.

Before passing to the examination of species, the author commences with that of the principles forming the basis of his divisions.

*Arabine.* Colourless, inodorous, insipid, transparent, fracture vitreous, friable. At a temperature of  $150^{\circ}$  to  $200^{\circ}$  it softens, and may be drawn out into thin laminæ; it is unalterable in a dry atmosphere, but is capable of acidifying after an exposure for some months to a moist atmosphere; insoluble in alcohol, not crystallizable, not undergoing alcoholic fermentation; soluble in water, 100 parts of this fluid at  $68^{\circ}$  F. dissolving 17.75, and  $212^{\circ}$  F. 22.54. A concentrated aqueous solution remains unaltered in vacuo, but when exposed to the action of the air, it becomes acid, and mucor forms on its surface. The rapidity of this decomposition, which is only partial, is proportionate to the elevation of the temperature.

According to Thomson, the silicate of potassa is the best reagent for detecting the presence of arabine. M. Guerin, however, has obtained precipitates with the sub-acetate of lead from a solution on which the silicate had no action. Having passed a current of chlorine through a solution of one part of arabine in fifty of water for ten hours, white flakes were formed, having the smell of chlorine, reddening litmus paper, and containing arabine, azote, and chlorine or chloric acid. The fluid was acid, and afforded a chloride of calcium on the addition of lime, without any indication of citric acid, a result which differs from that obtained by M. Vauquelin.

By sulphuric acid, and by following the plan of M. Bracot, the author obtained an alcoholic liquor which afforded granulated crystals, having a fresh saccharine taste, and which would not ferment with yeast. Nevertheless, M. Couverchel, by treating the indigenous gums with oxalic acid, converted them into a saccharine substance analogous to that obtained on treating fecula with sulphuric acid.

One hundred parts of arabine treated with 400 of nitric acid, gave 16.88 of mucic acid and a little oxalic acid. If more nitric acid be used, less mucic and more oxalic acid will be obtained.

*Bassorine.* Solid, colourless, inodorous, semi-transparent, uncrystallisable, difficult to pulverise, insoluble in alcohol and



in hot or cold water, only absorbing this fluid and swelling greatly, not undergoing the vinous fermentation. 100 parts treated with 1000 of nitric acid, afforded 22.61 of mucic and some oxalic acid; with sulphuric acid, it gave a saccharine matter not convertible into alcohol. Bassorine is extracted by means of water from the gum bassora of commerce. It must not be confounded with the substance which M. Pelletier has extracted from the gum resins, and to which he has given the same name.

	Arabine.	Bassorine.
<i>Composition.</i> —Carbon	43.81	37.28
Oxygen	49.85	55.87
Hydrogen	6.20	6.85
Nitrogen	0.14=100	0=100

*Gum Arabic.* When moistened, it reddens litmus paper; sometimes it has an acid taste; its aqueous solution, even when filtered, has a turbid appearance, which is owing to a small quantity of an insoluble azoted matter that it retains. Gum arabic several times treated with boiling alcohol affords supermalate of lime, chloride of calcium, potassium, acetate of potassa, a substance analogous to wax and chlorophylline. The ashes of this gum affords carbonates of potassa and lime, a little chloride of potassium, oxide of iron, alumine, silex, and magnesia.

*Gum Senegal* is in pieces which are sometimes very large, of an ovoid form and often hollow. Same properties as the preceding: the ashes give the same products.

*Cherry Gum.* This presents remarkable phenomena on the addition of water to it; when fragments are put into cold water they slowly swell, and are only partially dissolved. Thus 100 parts of water at 68° F. only dissolve 4.55 parts of this gum, and at 212° F. only 9.75, whilst the same quantity dissolves 24.17 of gum senegal, and 19.03 of gum arabic. Treated with alcohol and the nitric and sulphuric acids, it gives the same products as gum arabic; it is composed of,

1, Arabine; 2, Chlorophylline; 3, Waxy matter; 4, Traces of ligneous fibre; 5, Acetate of potassa, supermalate of lime, &c.

*Apricot Gum.* Same properties as cherry gum. The ashes contain the carbonates of potassa and lime, chloride of potassium, sulphate of lime, oxide of iron and silex.

*Plum Gum.* Similar to cherry gum in its properties. The ashes are identical with the preceding, with the exception of the presence of a little magnesia.

*Peach Gum.* Same properties as that from the cherry. The ashes give traces of manganese.

*Almond Gum.* Same properties as cherry gum. The ashes contain the carbonates of potassa and lime, sulphate of lime, chloride of potassium, oxide of iron, silex, and alumine.

*Gum Bassora.* M. Vauquelin, having macerated some in cold water for five days, could not dissolve the smallest portion of it; the same was the case when he used boiling water. These results are contrary to those obtained by M. Guerin, who has found this gum composed of two principles, the one soluble and the other insoluble in water; 100 parts of this fluid, at 68° F. dissolve 17.28 of the soluble portion, and 22.98 at 212° F.

Alcohol extracts from this gum, chlorophylline, a waxy matter, acetate of potassa, chloride of calcium, and supermalate of lime. Its ashes contain the carbonates of potassa and lime, traces of sulphate and phosphate of lime, chloride of potassium, alumine, silex, and magnesia.

*Gum Tragacanth.* According to Bucholz, this gum is composed of

Soluble part	57
Insoluble part	43=100

1. Seen through a microscope, gum tragacanth presents globules of various forms, some rounded, others oblong. The first resemble in form and size those of the potato; these globules are the only portions of the gum which are coloured blue by iodine.

2. After boiling gum tragacanth several times in water, the

filtered liquid is not coloured by iodine, whilst the insoluble portion assumes a blue tint.

3. It is probable, that the rounded globules of gum tragacanth, differ from those of starch only by the interior parts of the first being soluble gum, and those of the latter being soluble starch.

4. Gum tragacanth cannot be considered as a genus, since it contains several distinct principles: as arabine, or the soluble part; bassorine and starch, or the insoluble parts; waxy matter; chlorophylline, and various salts. Gum tragacanth is therefore composed of arabine and bassorine, containing a starch, which cannot be separated by boiling water.

*Flaxseed.* Its mucilage thickens water, is insoluble in alcohol, uncrystallizable, is not precipitated by galls or chlorine; is not coloured blue by iodine. Put into hot or cold water, it separates into two parts, the one soluble, and the other insoluble; the latter, treated with nitric acid, does not afford mucic acid, whilst 100 parts of the former give 14.25 and some oxalic acid. To obtain the soluble part, one part of flaxseed is to be treated by 100 parts of cold water; to obtain the insoluble portion, this fluid must be used at from 120° to 140° F.

Composition of mucilage of flaxseed:

Immediate.		Elementary.	
Water	10.30	Carbon	34.30
Ashes	7.11	Nitrogen	7.27
Soluble portion	52.70	Oxygen	54.74
Insoluble portion	29.89=100	Hydrogen	5.69=100

The ashes contain the carbonates of potassa and lime, phosphate of lime, chloride of potassium, sulphate of potassa, oxide of iron, alumine, and silex.

Soluble portion of the mucilage:

Immediate.		Elementary.	
Water	14	Carbon	44.75
Ashes	18.50	Nitrogen	1.01
Arabine and azoted matter	67.50	Oxygen	48.68
	<hr/>	Hydrogen	5.56
	100		<hr/>
			100

The nitrogen appears to be owing to a small portion of the insoluble part retained by the soluble portion.

*Mucilage of Mallow Root.* This contains a little arabine, starch, asparagine, and inorganic substances.

*Sugar of Milk.* One hundred parts treated by 600 of nitric acid gives 28.62 of mucic acid, and rather more of oxalic.

<i>Composition.</i> —Sugar of milk	96.18
Water	0.80
Ashes	0.02=100

*Summary.* M. Guerin divides, as we have already stated, the gums into two classes. The first soluble in water. The second insoluble in that fluid.

The *gums arabic* and *senegal* are composed of a great proportion of arabine, a little chlorophylline, of a waxy substance, acetate of potassa, supermalate of lime (which explains why they are generally acid), traces of an azoted matter and various salts.

The *indigenous gums* are but slightly soluble in water; by boiling them for several hours in a large quantity of this fluid, they are transformed into arabine, which leads the author to think, that if the trees that furnish them, grew in the warm climates of Asia or Africa, they would afford arabine at once.

The *gum bassora* of commerce is composed of arabine, chloro-phylline azoted matter, supermalate of lime, acetate of potassa, &c.

*Gum tragacanth* contains arabine, a small quantity of insoluble starch, a substance having the greatest analogy with bassorine, but differing a little in its elementary composition.

Chlorine bleaches all the solutions of gums. If the solution be boiled, from a half to three quarters of an hour, to drive off the chlorine or hydrochloric acid, it may be employed for any process in the arts.

Sulphuric acid transforms the gums into two distinct products:



The first, improperly termed gum, does not afford mucic acid; the second, slightly acid, having a sensibly saccharine taste, does not undergo the vinous fermentation.

Nitric acid, in acting on arabine, starch, and sugar cane sugar, does not furnish malic acid, as is generally thought, but a new acid, wholly distinct from the known acids.

The mucilage of flaxseed is not an immediate principle, as has been supposed by Thomson and others; it is composed of arabine, an azoted matter, and a substance insoluble in water which does not afford mucic acid.

The mucilage of mallow root contains a little arabine, starch and asparagine.

### 1. *Elementary composition of Gums.*

Gums.	Carbon.	Oxygen.	Hydrogen.	Nitrogen.
Gum arabic				
senegal	43.59	50.07	6.23	0.11
cherry	43.69	50.08	6.23	
apricot	44.03	49.76	6.21	
plum	44.56	49.29	6.15	
peach	43.17	50.52	6.31	
almond	43.79	49.97	6.24	
bassora,				
soluble part	43.46	50.28	6.26	
tragacanth,				
soluble part	42.01	54.57	6.42	
insoluble part,	35.79	57.10	7.11	

### 2. *Immediate composition of Gums.*

Gums.	Water.	Ashes.	Arabine.
Gum arabic	17.60	3	79.40
senegal	16.10	2.80	81.10
cherry	11.20	1.50	87.30
apricot	6.82	3.33	89.85
plum	15.15	2.02	82.83
peach	14.21	3.19	82.60
almond	13.79	2.97	83.24
bassora	21.89	5.60	11.20*
tragacanth	11.10	2.50	53.30†

\* And bassorine, 61.31.

† And bassorine and starch, 33.10.

3. *Quantity of Mucic Acid furnished by 400 parts of Nitric Acid and 100 parts of Gum.*

Gums.	Mucic acid.	Oxalic acid.
Arabine	16.88	a little
Bassorine	22.61	"
Gum senegal	16.70	"
cherry	15.54	"
apricot	15.97	"
plum	15.78	"
peach	14.99	"
almond	15.03	"
bassora,		
soluble part	15.42	"
tragacanth,		
soluble part	15.21	"
insoluble part	22.53	"

*Journ. de Chim. Medicale, Dec. 1831.*

ARTICLE XXIV.—*On the Metallic Base of Magnesia. By M. Bussy.*

When, in 1828, M. Woehler published his method of extracting the metal of alumine, by decomposing the chloride of aluminum by potassium, M. Bussy thought, from analogy, that glucinium could be separated from the chloride of that base by the same means, and the results confirmed this opinion. Since then, he has also isolated magnesium from its chloride. His memoir on this subject was read before the Royal Academy of Sciences on the 25th of January 1830, and of which the following is an abstract.

*Preparation of the Chloride of Magnesium.* Although magnesia heated to redness can be decomposed by chlorine, the chloride of magnesium is obtained with difficulty by this means; it may, however, be readily procured by previously mixing the magnesia with finely powdered charcoal. The

author advises equal parts of starch and calcined magnesia; after having mixed them thoroughly, by means of a small quantity of water, the mass is to be divided into small pieces, and strongly calcined in a crucible, preventing any access of air. This mixture is then to be introduced into a porcelain tube, through which a current of chlorine is to be passed, the tube being heated to redness. After some time the chloride of magnesium, which is fixed and fusible, flows along the porcelain tube and solidifies at the extremity. It then presents a white crystalline mass, presenting, on being broken, large brilliant laminae which are slightly flexible, resembling spermaceti; it is very soluble in water, of a pungent and bitter taste, and strongly attracts moisture. It should be observed that Ørsted and others have already applied this procedure in the preparation of various other chlorides.

*Preparation of Magnesium.* To obtain this metal, M. Bussy takes a tube of glass of about half an inch in diameter and tolerably thick. This tube, which is to be about twenty inches long, is to be curved into the form of a retort at one of its extremities. After having introduced five or six fragments of potassium of the size of a pea both into the curved and straight parts of the tube, fragments of the chloride of magnesium are to be added, interposing some small pieces of porcelain between them to prevent the chloride fusing into a single mass. This portion of the tube is then to be heated, and when it is almost of a dull red, the potassium in vapour is to be passed through it by heating the curved part of the tube that contains it. A very vivid incandescence results which successively extends the whole length of the tube. When the tube has become cold, the internal mass presents white metallic globules disseminated through the undecomposed chloride. If this mass be heated with water, a disengagement of hydrogen ensues, which is owing to a small quantity of potassium; white flocculæ of magnesia are formed at the same time, owing to the decomposition of the chloride of magnesium by the potash, and brilliant globules fall to the bottom of the vessel,

having the whiteness and lustre of silver. They are to be separated by decanting the fluid and washing them several times in water.

*Properties of Magnesium.* This metal is of a silvery whiteness, very brilliant and malleable, flattening under the hammer, fusible at a not very elevated temperature, unalterable in dry air, losing its metallic brilliancy in a moist atmosphere, and becoming covered with a white coating of oxide; this effect, however, is very limited, and is confined to the surface of the metal; when very small fragments of magnesium are heated, exposed to the air, they burn, throwing out sparks like iron in oxygen; larger pieces are slowly converted into pure magnesia; pure water, deprived of air, has no action on magnesium; when boiling it disengages a few bubbles of hydrogen. Certain saline substances greatly favour the decomposition of water by magnesium; the diluted acids attack this metal with a disengagement of hydrogen. Magnesium does not amalgamate with mercury, except when aided by heat, in which case, a very small quantity is sufficient to destroy the fluidity of the quicksilver. When this amalgam is agitated in a glass vessel, it becomes covered with a metallic coating like the amalgam of bismuth.—*Annales de Chimie.*

[In the same number of the *Annales* from which we have extracted the above, is also a memoir by Liebig, on the same subject, which sheds additional light on the subject. This chemist observes that the chloride of magnesium can be obtained by an easier process than that recommended by Woehler. This is by evaporating to dryness, equal parts of hydrochlorate of magnesia and sal ammoniac, and projecting the mixture in small quantities at a time, into a platina crucible, at a red heat, and continuing the heat till the whole of the sal ammoniac has disappeared, and the chloride is in full fusion. The chloride thus obtained resembles pure mica. The magnesium is to be reduced as follows: ten or twenty globules of potassium, about the size of peas, are to be introduced into a perpendicular glass tube, of about three or four lines in



diameter; over the potassium is to be placed the chloride of magnesium, and the tube heated till the commencement of fusion, when it is to be so inclined as to permit the potassium to flow through the chloride. M. Liebig also states, that if the small globules of magnesium thus obtained, be mixed with chloride of potassium, and heated in an earthen crucible, that they will unite at a temperature not exceeding the fusing point of silver.—Ed.]

## MISCELLANY.

*Blue extracted from the Stalk of Buckwheat.* (*Polygonum fagopyrum*).—A blue colour, serviceable for dying, may be extracted from buck-wheat, in the following manner:

The stalks are cut before the grain has become mature; they are spread out upon the earth, exposed to the sun, and suffered to remain till the grain separate with facility. When this has been effected, the straw is collected, wetted, and allowed to ferment until decomposition takes place, and the heap have assumed a blue appearance. It is then formed into balls or cakes, and dried by the sun, or in a stove. These masses being boiled in water will impregnate it with a deep blue, which neither vinegar nor sulphuric acid will discharge. Alkalies will change it to a red; the powder of nutgalls reduce it to a perfect black; and, by evaporation, it will become a beautiful green. Stuffs dyed with this preparation, and by the usual method, take the dies from other vegetable substances; the blue is very beautiful, and the colour stands well.—*Journ. Etrang. and Journ. Frank. Instit.*

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*Gum-resin of the Olive Tree.*—Dr Giadorou, of Sebenico, states, that the gum-resin of the olive-tree possesses purgative and tonic properties, and that he has used it with great success in the treatment of intermittent fevers. He gives it as follows:—An ounce and a half (Austrian weight) is divided into six parts, and one part taken every two hours. It produces two or three evacuations from the bowels, the appetite becomes excellent, and patients have told Dr G. that their strength has sooner revived after taking this remedy than when they have taken the quinine.

Dr G. states that he has given the remedy under notice in a great number of cases of epidemic intermittent fever, and with marked success. Several of these cases are related in the *Annali Universali di Medicina* for June 1831. *Amer. Journ. Med. Sciences.*

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*Persesquintrate of Iron.*—This article is strongly lauded by William Kerr, Esq. in a late No. of the *Edinburgh Medical and Surgical Journal*, as a remedy of great power in diarrhœa and some other affections of the mucous membrane of the alimentary canal. The following is his mode of preparing it:—“Take of small chips or pieces of iron wire, an ounce and a half; nitric acid, three ounces by measure; water, twenty-seven ounces; muriatic acid, one drachm.

“Put the iron into an earthenware vessel, and pour on the nitric acid, pre-

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viously diluted with fifteen ounces of the water. Set the vessel aside till the whole of the acid has united with the iron, so as to form a persesquinitrate; then decant the liquid from the portion of iron which remains undissolved, strain and filter. Add the muriatic acid with the remainder of the water, or with as much of that liquid as shall increase the whole solution to thirty ounces.

"The solution is completed in a space of time varying from seven to twelve hours according to the concentration of the acid and the thickness of the iron. If a less dilute acid be used, the time will be shortened; but in that case the heat evolved is apt to be so great, as to produce other combinations of the iron and nitric acid. I have always been in the habit of using rather thick pieces of iron; and the time required for the completion of the process is then from nine to twelve hours; but a quantity made lately with bell wire, was completed in little more than seven hours. When the process is finished, the liquid has a red colour, so dark, that viewed by reflected light, it seems almost black. The evolution of gas is then no longer perceptible. Three ounces of nitric acid of the usual strength (1.4) generally dissolve an ounce of iron, so that when the process is completed, a portion of the metal remains undissolved. The solution then consists entirely of the persesquinitrate of iron; and, if speedily decanted, it may be preserved in that state; but if allowed to stand a few hours longer on the iron, it will undergo a further change, gradually becoming converted into pernitrate and protonitrate of iron. The first of these is insoluble, and renders the liquid turbid, and the latter, which remains dissolved, has not the medical properties which render the persesquinitrate valuable. Carbonate of soda throws down from the solution of the persesquinitrate a precipitate of a pure red colour; but if the process has been carried too far, such precipitate has more or less of a greenish tint. When the solution contains nothing but nitric acid and peroxide of iron, it slowly undergoes decomposition on standing; so that at the end of a few weeks the whole liquid begins to become turbid. The addition of some muriatic acid prevents this decomposition, and the quantity sufficient for this purpose is too small to affect the medicinal powers of the persesquinitrate. The solution, when rightly prepared, is of a beautiful dark red colour when viewed with transmitted light. Its taste is very astringent, and not at all caustic."

Mr Kerr says, that to an astringent power, this remedy unites the property of diminishing the irritability and tenderness of the mucous membranes, with which it comes in contact.—*Amer. Journ. Med. Sciences.*

*Constituent parts of Cinchona.*—According to Mr R. Battley, the constituents of cinchona cordifolia, as determined by analysis, are, 1st, a free acid, easily disengaged by distilled water; 2d, quinine, obtained by neutralizing the acid No. 1 with magnesia; 3d, quinine independent of that which is in combination with the acid No. 1; 4th, bitter extractive; 5th, resin; 6th, gummy matter; 7th, gluten; 8th, tannin, combined with gallic acid; 9th, colouring matter; 10th, muriate of soda; 11th, sulphate of soda; 12th, iron; 13th, woody fibre.

Quinine is a bitter substance of the bark, forming characteristic salts with acids, and not containing any of the principles from No. 4 to 13; it appears to be an elementary substance.

In the preparation of the *liquor cinchonæ cordifoliæ*, it has been attempted to combine all the efficient properties of the bark (excluding Nos. 6, 7 and 13, in

which no active principle can be discovered), and it is presumed that the object has been effected in that preparation.

The *sulphate of quinine* can only be partially efficient as a medicine, in consequence of the absence of all the properties above mentioned (from No. 4 to 13); and the decided superiority of the *liquor cinchonæ*, as a medicine, being fully admitted by many competent judges, it appears to me to be of importance to place that preparation under the attention of the profession at large.—*London Medical Gazette*, December 1831, and *Amer. Journ. of Med. Sciences*.

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*M. Biett's Formulæ for the Preparation of Pills of Proto-Ioduret of Mercury.*—M. Biett employs the following pills in the treatment of syphilitic affections. 1st, R. proto-ioduret of mercury ʒj; powder of marsh mallow ʒj; M.; make into seventy-two pills. 2d, R. proto-ioduret of mercury ʒij; thrirdace ʒss; extract of guaiac ʒj; M.; make into forty-eight pills. M. Biett commences with one pill a day for the first three days, and gradually increases the number to three or four a day, never more than one however at a dose. M. B. at the same time, generally orders an infusion of the saponaria, with a little of the syrup of gum and of capillaire.—*Gaz. Med. Jan. 1832 and Amer. Journ. of Med. Sciences*.

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*Resin of the Cachou Nut.*—M. de Mattos, has found that the cachou nut (*anacardium occidentale*) contains much gallic acid, tannin, extractive, a gum resin, and a green colouring principle. The resin is fluid at 60° F; somewhat translucent; of an oleaginous consistence; congeals at 50° F; its taste is acrid, pungent and very caustic; its colour is of a beautiful brown approaching to red. When placed in contact with the skin, it promptly produces vesication, and tinges the spot of a brown colour, which lasts for some time. It thickens in the air; at an elevated temperature, it burns with a vivid yellow flame, throwing out sparkling jets of fire. It is wholly insoluble in water; in alcohol it is soluble, but still more readily in ether. Sulphuric acid, somewhat diluted with water, dissolves it without the aid of heat; the solution is precipitated by water, which separates the resin unchanged. The pure acid decomposes it, as does nitric acid. The hydrochloric and acetic acids have no marked action on this resin. The soluble alkalies dissolve without decomposing it. Lime forms with it a viscid, thready and very adhesive paste, which may be useful in the arts. The fixed and volatile oils readily dissolve it. It also unites with fatty substances, wax and resins. This resin is easily obtained by treating the pericarp of cachou nuts by alcohol, separating the latter by distillation, and washing the resin well with hot water, to remove all the gallic acid and tannin. It may also be prepared by boiling the nuts in water, collecting the resin which floats on the fluid, and subjecting the marc to pressure, to separate that which still remains. Gallic acid is tolerably abundant in these nuts, and may be extracted to advantage; it may be obtained very pure by the following process. The aqueous solution of the nuts is to be evaporated to the consistence of an extract, and treated with alcohol of 38° B. The fluid is to be filtered, and a small quantity of potassa added, which unites with the gallic acid, and precipitates the tannin in the form of a blackish liquid, of an oily appearance. The alcohol after having become clear by standing, is to be decanted. It holds in solution the gallate of potassa, and is to be treated by the acetate of lead; the gallate of lead is to be washed and decomposed by diluted sulphuric acid, which will afford tolerably pure



gallic acid. M. de Mattos is of opinion that this resin may be advantageously used as a permanent revulsant.—*Journ. de Pharm. Nov. 1831.*

*Styptic Powder.*—Dr Bonnafoux, of Montpelier, states that the following powder will check very severe hemorrhages.

R. Colophony	two parts,
Gum arabic	one part,
Charcoal	half a part.

to be well pulverised and mixed together.—*Jour. de Pharm.*

*Sulphuret of Carbon.*—M. Wutzer, has found this article to be one of the most diffusible and energetic of the stimulants, exciting the activity of the heart and arterial system, and producing a determination to the skin and kidneys. The dose is from three to eight drops, in mucilage or sugar.—*Ibid.*

*Paste of Gum Tragacanth.*—M. Mouchon, Jun. of Lyons, gives the following mode of making lozenges, which he states are preferable both in appearance and taste to those of jujube.

R.—White gum of tragacanth, free from any impurities	64 parts,
Fish glue, or dry gelatine from bones	96 parts,
Water	3000 parts,
Syrup of sugar at 25° and clarified	2000 parts,
Orange flower water	128 parts.

The gum tragacanth is to be bruised and placed in a tin vessel for 48 hours, with 2500 parts of the water. The fish glue is to be dissolved in the remaining 500 parts of that fluid, and both solutions strained through a fine linen cloth. The syrup is to be heated to ebullition, and the whole mixed together, placed over a good fire, and constantly stirred till the mixture assumes the state of a soft paste. It is then to be taken from the fire, the orange flower water added to it, and evaporated over a water bath, until it has assumed sufficient firmness, when it is to be run into tin moulds, previously coated with a thin layer of oil of almonds. At the end of a few hours, it assumes a sufficient consistence to be divided into lozenges.—*Journ. de Chim. Med.*

*Lozenges for cold in the head.*—Spitta recommends the following preparation as beneficial in freeing the nasal fossæ from the feeling of obstruction in coryza.

R. Pulv. cubeb.	ʒij
Bals. tolu.	gr. vj.
Mix well, and then add	
Ext. glyceirrh.	ʒj
Syrup. bals. peru.	ʒj
Gum arab.	q. s.

Rub well together, and make lozenges of ten grains each. One of these, on being placed on the tongue, gradually melts, and imparts a pleasant aroma to the mouth, whilst at the same time the obstruction of the nose disappears.—*Journ. de Pharm. Dec. 1831.*

*Sub-Chromate of Lead.*—MM. Vohler and Liebig give the following method of preparing this salt. The mode of operating by the moist way is well known.

Its discovery is due to M. Dulong. It does not appear that it will acquire a fine cinnabar red colour by this mode, the usual tint being of a deep orange. We have ascertained, that by melting the neutral chromate of lead, with nitrate of potassa, that a sub-chromate can be produced, of as beautiful a colour as the best cinnabar. The saltpetre is to be melted at low red heat, and small portions of pure chromate of lead successively added. At each addition of the latter, a violent effervescence takes place, owing to the disengagement of gas, and the mass becomes black; because the chromic red appears black as long as it is hot. The chromic yellow must be added until nearly the whole of the saltpetre is decomposed. Care must be taken not to heat the crucible too much, because too violent a heat will cause a brown, instead of a red colour. The crucible is now to be permitted to remain undisturbed for a few minutes, that the chromic red, which is heavy, may deposit, and the still fluid saline mass, composed of chromate of potash and saltpetre, is to be poured off. The chromic red remaining in the crucible, is to be treated with water, and after having been well washed, is to be dried. It is essential not to leave the saline solution too long in contact with the red powder, otherwise its brilliancy will be injured. Chromic red thus obtained is in the form of a powder, of a most superb cinnabar colour; when it is examined in a strong light, it is found to be composed of small crystalline plates.

The yellow chromate of lead is dissolved in large proportions by a concentrated and boiling solution of caustic potash. In a few days, this solution deposits groups of red crystals, which are composed of the sub-chromate, and not neutral chromate as has been stated.—*Annales de Chim.* July 1831.

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*New Metallic Dye.*—M. Robiquet having been consulted by a dyer in Paris, as to the article used in colouring a piece of silk of a dark grey colour, which resisted the action of all re-agents, this able chemist instituted some experiments, which showed that it was produced by a salt of silver; and further, that in all probability, the metal had first been applied in the state of a nitrate, and then converted into a chloride. He in consequence imitated the dye by immersing the cloth into a solution of nitrate of silver, and then, after drying it, into a solution of chloride of lime, and afterwards exposing it to a strong light. Different tints can be produced by employing different strengths of the metallic salt. But it should be noticed, that unless the whole of the dyed article be exposed to the same degree of light, that the colour will not be uniform.—*Journ. de Pharm.*

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*Cement for Glass or China.*—An ounce of pure gum mastic, is to be dissolved in q. s. of well rectified alcohol, and the same quantity of ichthyocolla steeped in water till soft, and then dissolved in alcohol; these solutions are to be mixed, and a quarter of an ounce of gum ammoniac added. The whole is now to be exposed to a gentle heat till perfectly amalgamated; when it is to be poured into a vial and kept well corked. When it is to be used, both the vial and the vessel to be mended are to be warmed, and the united fragments should be pressed in close contact for at least twelve hours.—*Journ. des Connais. Usuel.*

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*New Principle in the Bark of the Pomegranate Root.*—In a thesis presented to the Parisian School of Pharmacy, M. Latour de Trie announces the discovery of a new principle in the bark of the root of the pomegranate, and for which he proposes the name of *gravadine*. This substance is white, inodorous and of a slightly

saccharine taste. It presents various crystallizations. When in union with a small quantity of colouring matter, it crystallises in small conglomerated grains resembling a cauliflower, from which arise acicular crystals in silky tufts or stars. When entirely pure, it crystallises in a radiated form. When thrown on red hot coals, it burns, giving out a smell like that of burnt bread. When enclosed in a glass tube, and exposed to a gentle heat, it melts, and on cooling assumes a radiated crystalline form. At a high temperature, it emits a thick white smoke, which sublimes on the sides of the tube, in small granulated white crystals, leaving very slight traces of charcoal. It is perfectly neutral, is soluble in every proportion in cold water, slightly soluble in cold alcohol at 40°, much more so in hot alcohol, but precipitates on cooling.

Nitric acid rapidly dissolves it. When heated with four parts of hot nitric acid, it affords malic acid. Sulphuric acid dissolves it less promptly, and assumes a yellow colour which is permanent. When this is subjected to heat, it is transformed into water and a carbonaceous matter, which perhaps may be ulmic acid. Hydrochloric acid dissolves it very slowly, and on evaporation, again permits it to crystallise unaltered. It is soluble in potash and ammonia, and precipitated from all its solutions by the sub-acetate of lead. The salts of iron have no action on it. —*Journ. de Pharm.*

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*On the Powder of Milk.* By M. Legrip.—The powder of milk added to water, forms an agreeable drink, and forms an excellent substitute for milk. It is made as follows.

Milk	two pints,
Carbonate of soda	half a drachm,
Water	one ounce,
Sugar	one pound.

The soda is to be pulverised and dissolved in the water, and this solution added to the milk; the mixture is then to be gently heated and constantly stirred. When it is three-fourths evaporated, the sugar is to be gradually added, and the whole briskly stirred. After it is perfectly incorporated, the mixture is to be removed from the fire, poured into plates, and dried in an oven. When perfectly dry, it is to be finely powdered and kept in well stopped bottles. One or two ounces are sufficient for a bottle of water.

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<i>Pastilles of Milk.</i> —Milk	two parts,
Vinegar	half an ounce,
Carbonate of soda	one drachm,
Syrup of orgeat	two ounces,
Sugar	two pounds,
Gum arabic	two drachms.

The milk is to be boiled and coagulated by means of the vinegar, and the curd subjected to pressure. The soda is to be pulverised and dissolved in the syrup of orgeat. The curd is to be divided and briskly rubbed in a marble mortar, adding very gradually the alkaline syrup, and the rubbing continued till the mass is perfectly homogeneous and dissolves entirely in water, when the sugar and gum are to be added. This forms a paste which is to be divided into pastilles and dried, at first in the open air, and afterwards in a stove by a gentle heat; these pastilles must be kept in close vessels. —*Journ. de Chim. Med.*

*On the action of a mixed solution of the proto-nitrate and deuto-nitrate of mercury on azoted substances.* By M. Lassaigne.—An accidental circumstance led us to observe the colouring property possessed by a solution of mercury in nitric acid, made by aid of a low heat, when it is placed in contact with silk or wool, at a temperature of 112° to 120° F.

M. Lebaillif, who is indefatigably occupied in microscopical and chemical researches, informed us, some time since, that he had observed, that a crimson colour was produced by the addition of nitrate of mercury to certain vegetable principles, and especially those which contained azoted matters. This learned chemist tried the effect of this reagent on a great number of substances, and found that the colour was most vividly developed by the action of the mercurial solution on substances of an animal nature; that among the vegetable substances, it was only produced in those which contained more or less azoted principles; and also observed that no colour was developed if the two nitrates were separately used.

These results having been communicated to us by M. Lebaillif, we made conjointly some new experiments, and found that the production of the colour always took place, where a nitric solution of mercury was used, containing both the proto and the deuto-nitrate.

The manifestation of the colour is readily produced by moistening a solid animal matter, as the dried white of egg, caseum, horn, bone, &c. with the mercurial solution, and exposing it to a gentle heat by placing it on a plate of platina; held five or six inches above the flame of a candle, it becomes red in eight or ten seconds, and soon assumes a rich crimson tint. To produce the same effect in a liquid animal substance, as milk, mucus, a solution of gelatin, &c., a drop of the mercurial solution is to be added to a drop of one of these substances, and the precipitate which forms well stirred with a glass rod, and then gently heated.

We were at first of opinion that all organic azotic substances might be thus coloured; but repeated experiments have convinced us that there are many exceptions, though we are unable to account for them. The following list will present these comparative results.

*Substances which became red.* Fibrine. Dried albumen. Liquid albumen. Vegetable albumen. Gelatine. Caseum. Gluten. Horn. Nails. Milk. Serous membrane. Mucous membrane. Fibrous membrane. White wool. White silk. Sweet almonds. Wheat flower. Gray paper.

*Substances which were not reddened.* Urea. Uric acid (became a little yellow). Allantoic acid. Cystic oxide. Osmazome. Cholesterine (became yellow). Pieromel. Sugar of Milk. Ferment. Quinine and Cinchonine (somewhat yellow). Morphine and narcotine (yellow and afterwards reddish-brown). Oxalic, tartaric, malic and citric acids. Cane and beet sugar. Pure wheat and potato starch. Pure lignite. White paper. Cotton and linen thread.

From this list it is evident, 1st, that the red colour is not produced with all azoted substances; 2d, that those with which it is not produced, are such as are supposed to contain most azote; 3d, that those animal substances which are placed by chemists among the immediate neutral principles, present, with some few exceptions, this character; 4th, that among the compound vegetable substances, those which contain an azoted body, belonging to this class, become more or less red by heating them gently with the mercurial solution; 5th, that this action of the mer-



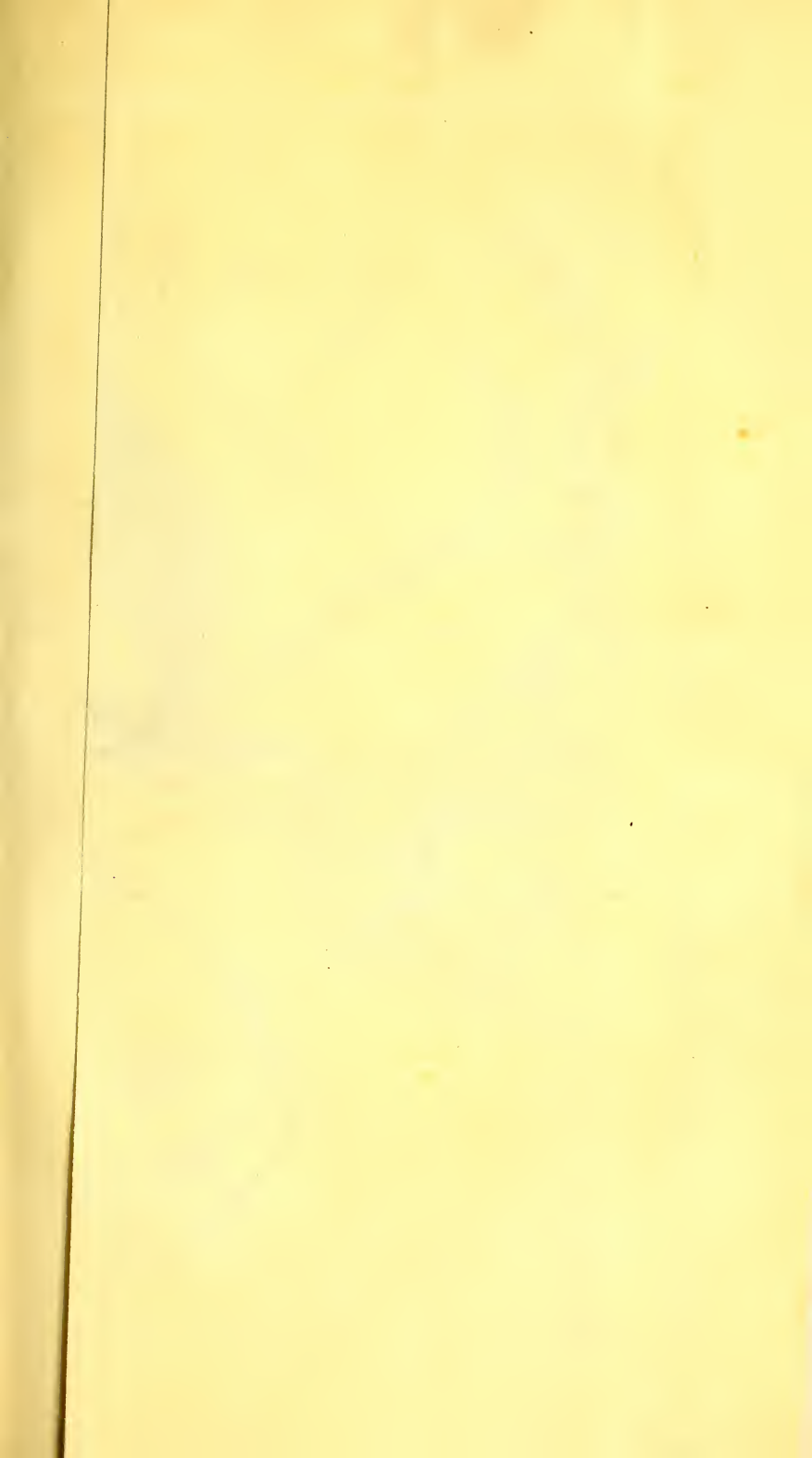
curial salt may be advantageously resorted to, to ascertain the purity of many immediate vegetable principles, as starch, sugar, gum, ligneous fibre, &c.; that is, whether these peculiar principles are not mixed with some of the azoted substances above enumerated.

These experiments induced us to try whether wool and silk might not be dyed by means of this salt. The trials we made on this subject, demonstrated that it was possible to communicate a purple colour of greater or less intensity to these substances, by placing them in contact with a nitric solution of mercury, made with one part of mercury, and two parts nitric acid of 28°, for ten or fifteen minutes, at a temperature of 112° to 120° F.

The solution of the mercury in the nitric acid is to be made by a gentle heat, and is then to be boiled for four or five minutes, to transform part of the proto-nitrate into deuto-nitrate. When it is used, it is to be diluted with an equal bulk of distilled water, and heated to the proper temperature, before the silk or wool is plunged into it. By this means we have imparted a colour to silk which appeared to resist the action of the light for a long time, and was unalterable by alkaline solutions, or diluted sulphuric or sulphurous acids. This colour appears to be owing to combination of the mercurial salt with the substance of the silk, as it is changed to a brown by the action of a hydrosulphate. We found that 100 parts of silk gained from 17 to 18 per cent in weight, by being subjected to the above mentioned process.—*Journ. de Chimie Medicale*.

#### ERRATUM.

Page 116, fourth line from the bottom, for Lake Erie read Lake Ontario.





*GILENIA TRIFOLIATA.*

(*Indica, physic.*)





Figure 5.



Drawn from Nature by W.P.C. Barton.

Tanner, Williams, Leary & Co.

## GILEENIA TRIFOLIATA.

(Indian-physisic.)

# JOURNAL

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## Original Communications.

ARTICLE XXV.—*On Gillenia Trifoliata.* By R. Eglesfeld Griffith, M.D.

Nat. Ord. ROSACEÆ.

Sex. Syst. ICOSANDRIA PENTAGYNIA.

GILLENIA. *Calyx*, subcampanulate, border 5-toothed. *Corolla*, partly unequal. *Petals*, 5, lanceolate, attenuated, coarctate at the claws. *Stamina*, fewer, included. *Styles*, 5, contiguous; stigmas, capitate. Capsule, 5-celled; cells, 2-seeded.—Nuttall.

*G. trifoliata.* *Leaves*, ternate; upper folioles lanceolate, serrate, subequal; lower folioles obtuse, with an abrupt, acute termination. *Stipules*, linear, entire. *Flowers*, terminal, loosely paniculated, 5-gynous; petals linear-lanceolate, obtuse. *Calyx*, tubulose, campanulate, ventricose. *Stamina*, included. *Capsule*, 5-celled, many-seeded.

*Synon.* *Filipendula foliis ternatis.* Gron. Virg. 55. Hort. Cliff. 191. Hort. Upsal. 131.

*Ulmaria major trifolia, flore amplo pentapetalo virginiana.* Pluk. Alm. 393. t. 236. f. 5. Ray. Sup. 330.

*Ulmaria virginiana trifolia, floribus candidis amplis longis et acutis.* Moris. Hist. 3. p. 325.

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*Spirea trifoliata*. Lin. Sp. pl. Willd. 2. p. 1063. Michaux. 1. p. 294.  
Pursh. Fl. am. bor. 1. p. 294, &c.

*Gillenia trifoliata*. Moench. Nuttall, Gen. 1. p. 337. Barton. comp.  
Flor. Phil. 1. 230.

*Icon*. Barton. Mat. Med. U. S. 1. t. 5. Curtis Bot. Mag. 489. Miller. Dict. t.  
256. Bigelow, Am. Med. Bot. t. 41.

*Common names*. Indian Physic. Ipecacuanha. Indian hippo. Dropwort,  
Meadow sweet. Bowman's Root, &c.

*Pharm*. Gillenia, U. S. Pharm.

*Officinal*. *Root*. Numerous slender roots radiating from a thick tuber, brown,  
annulated or knotted. Taste bitter and nauseous. Smell nauseaboud, like that  
of ipecacuanha.

*Description*. Root perennial, composed of a great number  
of slender brown caudexes which arise in a radiated form,  
from a dark brown amorphous tuber. Some of these caudexes  
or fibres are very long and are knotted, or annulated for a con-  
siderable portion of their length, giving these roots somewhat  
the appearance of those of the true Ipecacuanha. The number  
of stems varies much, there sometimes being only one, and at  
others many, arising from the same root. These stems are  
branched above, and are about two to three feet in height; they  
are usually of a reddish or brownish colour. The leaves are  
all ternate, the upper leaflets lanceolate, serrate and nearly  
equal; the lower ones broader towards the apex, but terminat-  
ing abruptly in an acute point. The stipules are linear and  
entire, but never subulate. The flowers are disposed in a ter-  
minal loose panicle, and are composed of five lanceolate-linear  
petals, somewhat obtuse and subunguiculate at their junction with  
the calyx. They are generally of a white colour, though it is  
by no means uncommon to find them of a rose tint. The flower  
buds are almost universally of a rose red colour. The calyx  
is tubular, campanulate, and somewhat inflated, terminating in  
five sharp segments. The stamens are about twenty in num-  
ber, inserted on the calyx and included; the anthers are small.  
The styles are five, with obtuse stigmas. The capsule is five-  
celled, connate, at the base unilocular, each cell containing two  
seeds.

*Habitat*. This species of Gillenia is found from Canada to

Florida on the east side of the great Alleghany ridge, generally occurring in hilly woods, in light gravelly soil; in the neighbourhood of Philadelphia it is by no means uncommon in certain localities. It begins to flower towards the latter end of May, continuing in inflorescence for about a month, ripening its seeds in August. It is well deserving of cultivation, not only on account of its medicinal properties, but also as an ornament to the flower garden. It may be readily propagated either by parting its roots or from seed; if the latter mode be adopted, the seed should be sowed as soon as they are ripe; by this plan a year is gained, for if they be sowed in the spring, they will seldom germinate till the succeeding year, and frequently totally fail. The young plants must be kept free from weeds, and set out in the autumn, about the time the leaves begin to decay. The situation in which they succeed best, is a shady border of light but rich earth.

*Botanical History.* The *Gillenia* early attracted the attention of the describers of American plants, and has been subjected to various changes of nomenclature, in common with the genus *Spirea*, with which it was for a long time united. Moench, however, proposed the formation of the present genus many years since, though it has only been within a recent period that botanists have assented to its propriety. It differs from *Spirea* in having the stamens included instead of exserted; in the capsule being uniformly five-celled, with the cells two-seeded, whilst in *Spirea* the seed vessel is two-celled and one-seeded. It is exclusively a North American genus, and consists of but two species, that under consideration and *G. stipulacea*, which replaces it to the westward of the mountains, and is distinguished by having the lower leaves pinnatifid, the upper ones trifoliate; folioles lanceolate, incised, serrate; stipules foliaceous, oblique and jagged. It is rare in limestone and alluvial regions, but is very common in hilly and sandstone districts, always preferring poor and gravelly soils. It blossoms in June and July. It closely resembles the *trifoliata* in its sensible properties, but is said to be more certain in its effects, and also



that it does not deteriorate by cultivation, which some circumstances would lead to a belief is the case with the *trifoliata*.

*Medical History.* The medical properties of the *Gillenia* were known to the aborigines, who were in the habit of prescribing it as an emetic of known and certain efficacy, long before their acquaintance with the whites. It is a curious fact, connected with the history of our vegetable materia medica, and is certainly somewhat humiliating to our claims of superior knowledge, that there is scarcely any native plant possessed of sanative powers with which the aboriginal inhabitants of the country were not well acquainted, whilst few, very few, vegetable remedies have been the result of scientific research. It is true that tradition and general opinion attributed marvellous powers to a number of plants, which experiment and analogy have shown to be inefficient and useless, such as the variety of Rattlesnake weeds, the specifics for the cure of hydrophobia, &c. Shoepf, who appears to have been impressed with an idea that every vegetable production of the new world was necessarily possessed of remedial virtues, as may readily be supposed, has not overlooked the *Gillenia*. He lauds it in the highest terms, considering it as a complete substitute for the South American root, though it requires to be administered in larger doses. Its properties were also known to Linnæus, who speaks of its reputed powers as somewhat extraordinary in a plant belonging to his natural order of *Senticosæ*. "*Spiræam trifoliatum; ipecacuanham vocant et vomitum facere dicunt quod sane singulare esset in hoc ordine.*" From a well founded opinion of its emetic properties, it has been admitted into all our dispensaries, and is also recognised by the U. S. Pharmacopœia.

*Medical Properties.* The root of the *Gillenia*, which is the active portion of the plant, is a safe and efficacious emetic in about the same doses as *Ipecacuanha*. In smaller quantities it is said to act beneficially as a gentle tonic, especially in that torpid state of the stomach accompanying some forms of dyspepsia. The use of the *Gillenia* as an emetic, is not confined

to practitioners, but is constantly resorted to in domestic practice in many parts of the country. The usual mode of taking it is in the form of an infusion, of which a small tea-cupfull is swallowed every half hour, until emesis is produced. Until very lately there was no doubt entertained of the activity of this medicine; but an essay of Dr Baum's,\* founded on actual experiments, having shaken the faith of many practitioners as to the utility of retaining this article in the *materia medica*, requires that we should examine the proofs adduced with more detail. For this purpose we shall first give an abstract of Dr Baum's communication, and then succinctly state some of the evidence on the other side.

Dr Baum prepared from the cortical portion of the root a powder, an extract, a vinous tincture and a watery solution, to which he appears to have given a fair trial on a number of patients with the following results:

*Powder*, in small quantities, produced little or no effect, and even in doses of one hundred to one hundred and fifty grains, caused very ineffectual vomiting; when combined with tartar emetic, no increase of the activity of the latter article was obtained.

*Extract, &c.* These, even in the largest doses, Dr Baum found to be perfectly inert.

The same experimenter also made a trial of the *Gillenia* as a tonic, "commencing with a small quantity and increasing it to one drachm every two hours. To give it a full and perfect trial, I continued the article in some cases two weeks, though without any advantage."

From these experiments, it would certainly seem that the *Gillenia* has been admitted on far too slender grounds to a distinguished position in the American *materia medica*, and is in reality an inert article, which should be expunged from the list: we, however, do not think that Dr Baum's experiments are sufficient to induce us to reject an article which has receiv-

\* Philad. Journ. Med. and Phys. Science, vol. v. p. 15.

ed the united testimony of the members of the profession, who speak of it in the highest terms, and recur to its use with as much confidence as to the true *Ipecacuanha*. Nothing in the present state of our knowledge is more wanted than a well conducted course of experiments on the various therapeutic agents habitually employed. To be complete, however, these experiments would require a devotion to the subject which few are willing or able to bestow on them. The article should be administered in its simplest form to healthy persons, whose age, temperament, sex, idiosyncrasy and diet are carefully noted, and the primary and secondary effects noted. After these trials have been repeated, and the phenomena produced clearly ascertained, the doses, preparation, and the channel by which the substance is introduced into the system, should be varied. It should then be tried on individuals of different physiological conditions; and finally, its real therapeutic powers be sought for, by commencing its use in simple but well marked diseases, whose seat and intensity can be readily ascertained; and afterwards the inquiry extended to such as are more complicated. Such a course of experiments, it is obvious, would be laborious and difficult, but the influence it would have on the medical art would be incalculable, and the practitioner who would thus determine the real value of any one article of the *materia medica*, would confer greater benefits on science and humanity, than by the addition of a host of new substances to our present therapeutic agents.

Opposed to the experiments of Dr Baum, we have general opinion, and what is of far more value, the concurrent testimony of a number of distinguished members of the medical profession, that the *Gillenia* is not only possessed of emetic qualities, but also that it is endowed with them in no slight degree. We have already noticed the opinions of Shoepf and Linnæus, and that of the compilers of our *Dispensatories* and *Pharmacopœias*; to these may be added the following, which we deem amply sufficient, without extending the limits of this essay in too great a degree.

Dr B. S. Barton observes, "I can speak with more confidence of the *Spiræa trifoliata*. It is a safe and efficacious emetic in doses of about thirty grains. Along with its emetic, it seems to possess a tonic power."\* This opinion is confirmed by Dr W. P. C. Barton, who adds, that country people have frequently used the plant so incautiously, as to be under the necessity of resorting to medical aid.†

Dr Eberle states, "from my own experience with this plant, which has not been inconsiderable, I am led to regard it as very little inferior to the officinal *Ipecacuanha* as an emetic. Like this latter article, it is a safe and efficacious vomit. While practising in Lancaster county, I employed this plant very frequently as an emetic, in the treatment of intermittent and bilious fevers, and it very seldom disappointed me of the desired effect."‡

Dr Zollickoffer also says, that from a trial he made of it, he found it was mild and efficacious in its operation.§

Professor Bigelow, in speaking of this plant, gives it as his opinion that it possesses properties analogous to the *Ipecacuanha*; it must, however, be also stated, that he adds, it requires a larger dose, and that he has not been satisfied that it is certain in its operation.|| We might quote a variety of additional authorities in support of the emetic powers of this substance, but the above are sufficient to show that Dr Baum's failures with it were owing in all probability to some fortuitous circumstance. The parcel of roots which he employed, might have been deteriorated by age, or have been obtained from cultivated plants, both of which circumstances are said to have a very detrimental influence on its medicinal powers. But even granting that the article he used was good, it ought to require more than one set of experiments, with similar results, to induce us to eliminate an article from our materia medi-

\* Collections for an Essay towards a Mat. Med. of the U. S. p. 27.

† Veg. Mat. Med. U. S. vol. 1, p. 69.

‡ Mat. Med., &c. vol. 1. p. 67.

§ Mat. Med. U. S. p. 165.

|| Am. Med. Bot. vol. 3, p. 13.



ca, which has received such high and authoritative praise as the plant under consideration; we were in hopes to have presented at this time the result of a course of experiments made with the powder, and some observations on its active principle, but owing to the derangement of plans caused by the prevalence of the epidemic among us, we have been obliged to postpone them till the next number.

What has been said above in praise of the *G. trifoliata*, applies with greater force to the *G. stipulacea*, which is possessed of more unequivocal powers than the former, and is constantly used in our western states.

*Pharm. Preparations and Mode of Administration.* The Gillenia may be given either in powder or strong infusion. The former mode, however, is preferable and is generally adopted, the dose, as an emetic, is about thirty grains. When employed as a tonic in dyspepsia, it is to be given in small quantities, two to four grains. United with opium alone, or in the form of Dover's powder, it may be successfully resorted to as a sudorific.

*Analysis.* It appears that although the whole root is possessed of marked qualities, that it is the cortical portion which is the most active and should be used. The cortex bears a very large proportion to the woody fibre, as from  $\frac{3}{4}$  lb of perfectly clean and dry root, Dr Baum obtained  $\frac{3}{4}$  lb 13 gr. of cortex.

No complete analysis of the Gillenia has yet been laid before the public. Dr Bigelow states, "that the predominant soluble ingredients in this root appear to be a bitter extractive matter and resin. When boiled in water, it imparts to it a beautiful deep red wine colour, and an intensely bitter taste. This decoction undergoes no change from alcohol or gelatine, though it gives a precipitate with muriate of tin. Water distilled from the root has its peculiar flavour with little of the bitterness. A large portion of resin is precipitated on the addition of water to an alcoholic tincture of the root." From an analysis by Dr Staples, it appears that the active principle of the Gillenia is not emetin.

ARTICLE XXVI.—*Note on the Effects of Cantharides subjected to ebullition.* By J. Scattergood.

IN consequence of the absorption of the active principle of the Lyttæ, blisters are apt to occasion strangury and bloody urine; it has been a problem, therefore, of some importance, to discover a plan by which such an absorption may be obviated; for this purpose camphor has been recommended to be mixed with the blistering composition, and a piece of thin gauze has been interposed between the plaster and the skin, but it has been found (Paris states in his Pharmacologia) that ebullition in water deprives the Lyttæ of all power of thus acting on the kidneys, without in the least diminishing their vesicating properties.

Dr Theophilus Beasley of this city, in a course of experiments instituted to ascertain the correctness of this statement, has found that if Cantharides in their *unpowdered state* are thrown into water at the boiling point, and boiled for fifteen minutes, they lose the property of producing strangury, and retain that of vesicating unimpaired: if suffered to remain more than seventeen, the latter is affected, and under fifteen minutes do not lose the former. The water in which they are boiled becomes quite dark, and the extract prepared by evaporating it, blisters in the usual time, but whether it produces strangury or not has not been ascertained.

In many trials which Dr B. has made with an ointment prepared with Cantharides treated in this manner, he has never known it to produce strangury except in two or three instances, in all of which the effect might very fairly be attributed to the presence of diseases which are known to produce it, such as dysentery and diarrhœa. Many of the patients on whom it was applied could not use the ointment prepared in the usual way, without being more or less troubled with this painful affection.

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It is probable that decoctions of Cantharides in sweet oil, and the oleaginous extracts prepared with Spirits of Turpentine or Ether, mentioned on page 212, vol. 3d of this Journal, may possess similar properties. The subject is one of importance, and well worthy the attention of physicians.

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ARTICLE XXVII.—*On the Cacoucia coccinea.* By R. Eglesfeld Griffith.

IN no part of the world has nature poured out her vegetable treasures with more profusion, than in the tropical regions of America; and under the high and unvarying temperature to which they are there subjected, they become endowed with active qualities which are rarely to be found in the vegetables of more northern climates. Notwithstanding the long list of valuable therapeutic agents which we derive from thence, an immense number still remain to reward the researches of the naturalist. For most of those which now enrich our materia medica we are indebted to the natives; thus, the Cinchona, the Ipecacuanha and the Jalap, were esteemed as remedies of a high order, long before the appearance of Europeans in the western hemisphere. But many, a vast many, still remain, the properties of which, though familiar to individuals, will perhaps be never promulgated to the world except from accident, or a concurrence of fortunate circumstances. Within a comparatively short period, however, medical botany, in common with its sister sciences, has received an impulse which promises to afford many additional remedies to the healing art. When we view the endless variety in the sensible properties of vegetable substances, in conjunction with the improvements

in vegetable analysis, we have every reason to expect the discovery of new and important medicinal agents under a continuance of those researches.

Among the many plants which are scarcely known, except to the natives of South America, to be possessed of high remedial powers, is the *Tikimma*, a twining shrub found in the vicinity of Surinam, and described by Aublet under the name of *Coucinea*. For most of our information as respects its medicinal powers, we are indebted to a manuscript account by Dr Nassy, in possession of the American Philosophical Society. Dr Nassy was for a long time in Surinam, and appears to have paid much attention to the vegetable materia medica of that country.

*Coucinea coccinea*. Decandria monogynia. L. Syst. sex. Onagræ. Juss. Nat. ord.

*Calyx*. Superior, bell-shaped, red, 5-parted, deciduous.

*Corolla*. Petals 5, red, acute, ovate, inserted at the divisions of the calyx. *Pericarp*, a berry, 5-angled, almost woody, pulpy within, covered with a white skin.

*C. coccinea*. Aublet, Plantes de la Guiane, p. 450, t. 179. Lamarck, Encyclop. illus. 359. Jussieu, 320.

*Schousbæa coccinea*. Willdenow, 857.

The *Tikimma* is a perennial twining shrub, which is generally found in low swampy situations, having a stem of six or seven inches in diameter at the lower part, and climbing to the tops of the highest trees, from whence its branches hang down covered with leaves and flowers. The leaves are alternate, smooth, coriaceous, ovate and acuminate, with short petioles. The flowers are scarlet, situate at the extremity of the branches in long loose spikes, and are succeeded by a dryish berry, the taste of which is sour, bitter and somewhat astringent. Its colour is yellowish within and green externally; when dried it has a nauseabond taste. Aublet mentions that the Galibis, one of the native tribes, are in the habit of rubbing the noses of their dogs with these berries before commencing a chase, as they are impressed with a belief that this process renders the sense of smell more acute.



The Tikimma appears to possess emetico-cathartic properties in no slight degree, even when applied externally, and is used by the Indians as an application to ill-conditioned ulcers. Dr Nassy details several cases in which he saw it used with complete success. The fruit is to be rasped and applied to the ulcer; in about an hour nausea is produced, followed by copious vomiting or discharges by stool; the ulcer is then washed with a decoction of the leaves of the plant, and cataplasms of them used till a cure is effected, which he observed soon takes place. In one case in which Dr Nassy employed it in an exostosis of the tibia, it induced so violent and long continued a diarrhœa as to almost destroy the patient.

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ARTICLE XXVIII.—*On the Preparation of Glauber's and Epsom Salt and Magnesia, from Sea Water.* By Daniel B. Smith.

[The first series of the Journal of Pharmacy, which extended to four numbers only, and was published at long and irregular intervals, having but a very limited circulation in comparison to the present improved form in which it is presented to the public, we have thought that a republication of such of the original papers contained in it as possessed general interest, and were susceptible of practical application, would prove useful to such of our readers as do not possess the original series. With these views we give in the present No., Mr Smith's Observations on the Manufacture of the Glauber and Epsom Salts, and those of Mr Evans on the Black Oxide of Mercury.—ED.]

The fact that nearly all the Glauber's Salt consumed in America is prepared from sea water, and the silence of authors

in relation to this mode of obtaining it, will give interest to the following details. They have been communicated by a gentleman who was formerly engaged in large salt works in Massachusetts, at which all these salts were manufactured.

The brine at these works is pumped into vats of the capacity of six hundred or a thousand hogsheads, where it is concentrated by evaporation in the sun to the strength of a saturated solution. It is then drawn off into a second vat, called the pickle vat, of about half the size of the first, in which it is cleared from impurities, and thence transferred to a third still smaller vat, in which the evaporation is finished and the common salt formed. When crystals of Epsom salt begin to deposite, the mother water is drawn off, and kept under the name of bitterns, for the Epsom salt and magnesia works.

The season for making salt is over by the end of October, and the large vat is then filled with brine, which the sun and high winds of the two succeeding months concentrate to the strength of pickle. This is drawn off into the pickle vat, in which it remains till spring, when it is transferred to the third vat and evaporated to obtain the common salt. During, however, the extreme cold weather, a crystalline deposite is formed, consisting chiefly of sulphate of soda, which is taken out with iron rakes having strainers attached to them, and then purified for sale by recrystallization. The best formed crystals are sometimes dried and sold in their impure state.

The bitterns consists chiefly of sulphate of magnesia and hydrochlorates of magnesia and lime, of which the latter two do not easily crystallize. It is evaporated slowly, and the Epsom salt may, with proper care and washing, be obtained very pure. When evaporated too hastily, it is mixed with hydrochlorate of magnesia, a very bitter and deliquescent salt.

To obtain the magnesia, the bitterns is diluted to a certain standard (upon the strength of which the degree of the firmness and compactness of the magnesia is said to depend) and mixed with a solution of pearl ash. The precipitate is repeatedly washed in water, which is at first hot and gradually cooled,

till it comes off quite tasteless. The box in which it is washed is twenty-five feet in length by twenty feet in breadth, and three in depth, and has a strainer of canvass for a bottom. When sufficiently pure, the magnesia is allowed to thicken, and is then poured into square moulds placed on canvass strainers. When these are full, and the magnesia has obtained the proper consistence, the moulds are lifted off, and the next day the magnesia is removed into the drying oven, where it is kept for forty-eight hours, at a temperature of  $190^{\circ}$ , then taken out, scraped, and packed up for sale.

In attempting to investigate the rationale of these processes, I shall assume as correct the experiments of Dr Marcet, published in the Philosophical Transactions for 1819. This excellent chemist obtained from five hundred grains of sea water, from the middle of the North Atlantic ocean, having the specific gravity of 1.02886, the following precipitates:

Chloride of Silver,	-	-	-	42	grs.
Phosphate of Magnesia,	-	-	-	2.7	
Sulphate of Barytes,	-	-	-	3.85	
Oxalate of Lime,	-	-	-	8	

equivalent to

Chlorine,	-	-	-	-	10.356	grs.
Magnesia,	-	-	-	-	1.125	
Sulphuric Acid,	-	-	-	-	1.305	
Lime,	-	-	-	-	.35	
Sodium,	-	-	-	-	6.037	

The state in which these elements exist in sea water is involved in much obscurity. According to the temperature employed in the evaporation, we procure from it either sulphate of lime, sulphate of magnesia, or sulphate of soda. It is therefore evident that a change of temperature is sufficient to disarrange the combinations that usually obtain.

If we suppose the sulphuric acid to exist in combination with soda, the following may be considered as the composition of 1000 grains of sea water.

Sulphate of Soda, - -	4.698	grs.
Hydrochlorate of Magnesia, -	6.4125	
----- Lime, - -	1.625	
Chloride of Sodium, - -	26.27	

If it be combined with magnesia, the following arrangement may be considered as obtaining:

Sulphate of Magnesia, - -	3.915	grs.
Hydrochlorate of do - -	2.69325	
----- Lime, - -	1.625	
Chloride of Sodium, - -	30.185	

The latter formula agrees better than the former with the medium proportion of salt (which is about three per cent) in sea water. If sulphate of soda be the salt naturally in solution, I know of no law to determine the formation of sulphate of magnesia. If the latter salt be the one ready formed in sea water, the production of sulphate of soda during intense cold will be in agreement with two known laws. One of these is, that solutions of sulphate of magnesia and chloride of sodium decompose each other when exposed to a freezing temperature, as first remarked by Gren. The other is the very remarkable law of solubility of sulphate of soda. At 32° F. 5.02 parts of the dry salt are soluble in 100 parts of water, and 50.65 parts at 102°; whereas the solubility of chloride of sodium is scarcely affected by the temperature. The pickle in which the Glauber's salt forms, is a nearly saturated solution of salt, and remains liquid at zero. At this temperature almost the whole of the sulphate of soda will crystallize. It is therefore probable, that the sulphuric acid exists in sea water in combination with magnesia.

The formation of Glauber's salt cannot be advantageous to the manufacturer. It lessens the production of common salt about thirteen per cent; and though the same quantity of magnesia can be obtained from the bitterns, it will not yield Epsom salt.

It is much to be wished that accurate observations should



be made on the spot, of the composition of the bitters, and the various phenomena occurring at a salt works. Much advantage would result to the manufacturer in point of economy, and new light be thrown upon an obscure and intricate subject.

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ARTICLE XXIX.—*Remarks upon the Preparation of the Black Oxide of Mercury. By Thomas Evans.*

THE black oxide or protoxide of mercury is the active constituent of the blue mass, or pilulæ hydrargyri of the Dispensatories, the hydrargyrum cum creta, the blue mercurial ointments and plasters, and the black mercurial wash. In all these preparations, except the last, only a small portion of the quicksilver is really oxydized. By long trituration with viscid or fatty substances, the metal is divided into globules so very minute as not to be discernible by the naked eye; yet they may readily be seen with a glass; or they may be rendered visible in the blue pill without a glass, by washing it in successive portions of clear water until the saccharine and farinaceous parts are removed. In like manner, if the mercurial ointment is melted by a gentle heat, and the supernatant oil decanted, a dark blue powder, and a considerable portion of quicksilver will remain at the bottom; the blue powder, which is the oxide, will be found to bear but a small proportion to the unoxydized metal; in the strong ointments, not more than about one-fourth.

The pilulæ hydrargyri, of the Apothecary's Hall in London, where they have the advantage of appropriate machinery, and great mechanical force for exposing every particle of the mass most effectually to the action of the atmosphere, and thus promoting the rapid absorption of oxygen, is, notwithstanding,

far from being certain in its strength. The minute globules of mercury may be readily seen in it with the glass, or separated from it by maceration in warm water.

From one hundred grains of blue pill which had been triturated for many days, twenty grains of running mercury were easily obtained, and numerous globules were still visible in the residuum. This article, previous to washing, presented all the appearances which usually denote the oxydation of the metal, and was pronounced good by those who had employed it in practice. One hundred grains of that prepared at Apothecary's Hall, London, yielded about the same results. The whole quantity of the metal contained in the hundred grains was 33.333 grains; it is, therefore, probable that not more than one-fourth of it was converted into black oxide.

The difficulty and tediousness of the process of trituration, by which the Dispensatories direct the blue pill and ointments to be prepared, have sometimes induced the operator to add a small portion of sublimed sulphur in order to facilitate the extinction of the globules. This, however, changes entirely the character of the compound, forming an imperfect black sulphuret of mercury, and, of course, destroys the value of the preparation. It may be detected by the *black* colour of the pills or ointment, which, if properly prepared, are of a blue colour.

The various strength and the uncertain effects of the different preparations of the black oxide here noticed, render it a desideratum in pharmaceutical chemistry, to discover some process by which the oxygen and mercury may be more directly and intimately combined, so as to produce a compound of equal efficacy with that prepared by the slow and imperfect means of trituration.

The protoxide of mercury was first described with accuracy by Dr Boerhaave, who procured it by enclosing a small portion of the metal in a large, strong phial, and attaching it to the spoke of a mill wheel; the rotation of the wheel kept the metal

in constant agitation, exposing all its particles to the action of the air in the phial, by which means it was converted into a dark blue, or nearly black powder, to which he gave the name of *Ethiops per se*. He describes it as destitute of lustre, of a coppery taste, and wholly insoluble in water. The length of time required for this process induced the idea of obtaining the oxide by the use of an acid; and, accordingly, the nitrate and mild muriate of mercury have been decomposed by an alkali, in order to procure it. The result is a powder nearly similar to that described by Boerhaave and by Homberg, who obtained it in 1699. M. Guibourt asserts that the compound obtained by this process contains globules of running mercury, which may be seen with a glass, or rendered visible to the naked eye by subjecting it to pressure. It seems probable that the preparation which presented this appearance to him, must have been improperly made, or in some other way defective. Of several parcels which I have prepared, none have exhibited any globules, though examined through a glass of considerable power, nor could any be rendered visible, though the article was subjected to the force of a powerful screw press.

In the last (6th) edition of the American Dispensatory, the black oxide appears to be confounded with the *hydrargyri oxidum cinereum*, or *pulvis hydrargyri cinereus*, which is not the black oxide purely, but a compound of this with the triple salt formed by the oxide, ammonia and nitric acid. After directing the oxide to be prepared by boiling the sub-muriate of mercury in lime water, it observes: "when properly prepared it is the protoxide of mercury; but, as frequently found in the shops, it contains a mixture of the triple salt, consisting of oxide, *ammonia*, and *nitric acid*." This could not occur in that prepared from calomel and lime water, because neither ammonia nor nitric acid are employed in any part of the process. The powder prepared with the solution of nitrate of mercury and the water of ammonia, as directed in the fourth

edition of the Dispensatory, is different, both in appearance and composition, from the black oxide prepared by the other alkalies, and it therefore seems proper that it should be designated by a different name.

The Prussian College direct the preparation of an oxide, by precipitating a saturated solution of quick-silver in nitric acid, by the water of caustic ammonia, as long as a black powder is thrown down. But here, again, the triple salt is formed, which mixes with the oxide, and yields only the pulvis hydragryri cinereus. The operation, though carefully performed, yielded a powder of a beautiful light blue colour, evidently containing a large portion of the triple compound.

After repeated experiments with the different alkalies, the following process has been adopted as yielding a preparation most nearly resembling, in its appearance and effects, the oxide formed by trituration. Take of sublimed sub-muriate of mercury, four ounces; pure caustic potass, four ounces; water, one pound. Dissolve the potass in the water; if any impurities appear, let it stand until the solution is perfectly clear, and then decant; mix the sub-muriate with this, and shake them frequently. Pour off the liquid, and wash the precipitate with water, until the muriate of potass is totally removed; dry the residuum with a very gentle heat.

The American Dispensatory recommends the use of the precipitated sub-muriate of mercury, thoroughly washed, but not dried, instead of the sublimed sub-muriate; but experiments made with the former preparation did not appear to give it any preference over the calomel by sublimation.

The calomel of the shops frequently contains a small portion of the muriate of mercury. When this is the case, on adding it to the solution of potass, an orange-coloured or red precipitate is formed with the black oxide, which injures the preparation. Particular care should therefore be taken not only to procure the best calomel; but also to free it entirely from the muriate by frequently washing it in boiling water. As the



corrosive sublimate is more soluble in alcohol than water, it may be of some advantage to substitute it for the latter, toward the close of the process of edulcoration.

The protoxide of mercury yielded by the process here described, is a fine ponderous powder of a greenish black colour, destitute of lustre or odour, of a coppery taste, and insoluble in water. The relative proportions of oxygen and metal, which enter into its composition, have been variously stated. Fourcroy estimated that 100 parts of mercury were combined with 4.16 of oxygen. Sir Humphrey Davy and Seftstrom give 3.99 as the proportion of oxygen, and the Edinburg Encyclopedia puts it at 5. Chevenix computes that 12 parts of oxygen combine with 100 of metal, and the Portuguese chemists state the composition at 100 and 8.1. Of these various estimates we may assume, as a near approximation to the truth, the proportion of 100 parts of mercury and 4 parts of oxygen.

Of the medical virtues of this preparation, or the comparative effects resulting from its use, and that of the blue pill, it will not be expected that I should state any thing from my own knowledge. Dr Benjamin H. Coates, at whose suggestion the article was first prepared, and who has used it considerably during the last seven months, has politely furnished me with the following particulars. Used as a substitute for calomel, it appears to be more apt to vomit, and to act more as a cathartic, two grains, in almost every instance, operating several times. The largest dose given by him was twenty grains, in a case of puerperal peritonitis, and with success. It appears to act more mildly as (what has been called) a *contra-stimulant*, than calomel. As an alterative, it is, beyond all comparison, preferable to the blue pill, prepared in the ordinary way by trituration, being more certain, efficient, and regular. Half a grain is quite a sufficient dose, to be taken at bed time, and probably one-fourth of a grain might answer the purpose, as this quantity appears to be equal in strength to three or four grains of the blue mass.

From these facts it is evident that the black oxide, prepared with potass, is a valuable medicine, and promises to furnish us with a substitute for the blue pill by trituration, which combines the advantage of far greater facility of preparation, with equal, if not superior, medical virtues.

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ARTICLE XXX.—*Pharmaceutical Notices, No. 5.*

*Ung. Hydrar. Nit.* Not having succeeded in making the Ung. Hyd. Nit. satisfactorily, according to the directions of the Pharmacopœia, prepared it 4th Mo. 5th, 1832, by simply adding to  $f\text{3xij}$  of neat's foot oil, a solution of  $3i$  hydrargyrum in  $f\text{3xi}$  of acid nitric. Being mingled together cold and stirred frequently, the mixture became stiff in about four or six hours, and formed a more beautiful preparation than I have before seen, and of a consistence rather softer than red precipitate ointment.

Upon examining the same article after the lapse of nearly six months, it is found to be as soft and unctuous as at first, but somewhat changed to the greenish hue commonly assumed by this preparation. It does not appear to be more rancid than ointments commonly are after being kept a short time.

*Camphorated Tr. of Soap.* (4th Mo. 25, 1832.) Found upon dissolving one pound of soap (Castile) in one gallon alcohol, that the solution upon cooling assumed the semi-fluid state, nearly like opodeldoc, though not quite so firm. We have hitherto used a small proportion of water, say one third water and two-thirds alcohol, and found our liniment fluid, in which state I suppose this preparation ought to be found.

*Coxe's Hive Syrup.* Having experienced (as no doubt

others have) considerable difficulty in keeping this preparation without fermentation, I have been induced to prepare it by boiling it to a much thicker consistence than directed by the Pharmacopœia. Having taken the proportion and quantity of ingredients directed, instead of to three *pints*, as there ordered, I reduce the syrup to *two and a half pounds* avoirdupois, to which I add forty grains tartar emetic. I notice in this mode of preparation, however, a difference from that of the Pharmacopœia, inasmuch as in the latter one grain of the salt is added to a *fluid* ounce of the syrup.

Upon reference to the original recipe of Dr Coxe, it will be perceived that he directs that sixteen grains of the tartar emetic shall be added to each *pound avoirdupois*, in which respect the preparation herein mentioned corresponds with his.

If it be deemed more accurate to substitute the fluid measure for that originally directed, the proportion requisite might be easily ascertained, but the article thereby is very materially diminished in strength, as it will be found that sixteen ounces avoirdupois of the syrup, will not *measure* more than ten or twelve, thus making a difference of from one third to one fourth in the quantity of the salt in any given portion of the medicine.

If the fluid measure is adopted, I would propose to increase the quantity of tartar emetic from one grain to one and a half grain to each ounce of syrup.

I should add, that hive syrup, carefully prepared in the manner above mentioned, does not ferment even in the warmest weather. In the preparation of this and some other similar articles, a degree of inaccuracy may occur from the want of *sufficient* direction on what may seem in different points. For instance, in the straining which the decoction for hive syrup is directed to undergo, no specific *kind* of strainer is directed ; some, therefore, will probably use a linen or muslin, and some a flannel strainer, and consequently more of the finer parts of the roots used will pass in the one case than the

other; and again what does pass, according to the Pharmacopœia, is *all* to be added to the honey for the formation of the syrup. This, however, will be found very much to diminish its nicety, as the decoction ought to be suffered to stand till perfectly clear, and the clear liquor mixed with the honey. Would it not be expedient to direct what kind of strainer would be most suitable in such preparations, inasmuch as *paper* is specified for filtering?

I am in the practice of using a screw press in obtaining the decoction from vegetable substances. W. S.

*Unguentum Tart. Ant.* Should not a formula for the preparation of this ointment have been given in the U. S. Pharmacopœia. It is extensively used by some practitioners, and although it can be extemporaneously made, the same reason for exclusion would apply equally well to several of the ointments of the Pharmacopœia, as the Ung. Sulphuris, Ung. Zinci Oxidi, &c. There is also another point in connection with this ointment which deserves notice—it acts with a promptitude in a great measure proportionate to the degree of fineness of the tartar emetic employed in its composition. The best ointment we have seen, was made by making a saturated solution of the salt in water, and precipitating it by means of alcohol; by this process it can be obtained in a perfectly impalpable state.

*Ferri Carb. Præcip.* The directions given in the Pharmacopœia for the preparation of this article, will not, we think, give a pure carbonate of iron. The sulphate of iron always contains some per-oxide, and when the solutions are mixed as ordered, there will be a precipitation, not only of proto-carbonate, but also of this per-oxide, the former of these being of a greenish colour, and the latter brownish red; the precipitate will be of a dirty green, the proto-carbonate, however, being decomposable in the air; in the process of drying, the carbonic acid in a great measure escapes, whilst oxygen is



absorbed, and the precipitate becomes a reddish brown oxide of iron, in union with a small portion of carbonate.

*Potassa.* The preparation of this caustic substance, as ordered in the Pharmacopœia, is also liable to objections; the carbonate of potash of the shops is seldom pure, and the consequence is, that the caustic potash obtained from it will be adulterated with sulphates and muriates of potash, lime, silica, &c.; it is true that it does not militate in any great degree against its escharotic powers, but as the object of the compilers of the Pharmacopœia was to present the best formula for each preparation, we would invite their attention to the mode proposed by Mr Donovan (Dublin Phil. Journ. 1, p. 48), for making this article. He uses the crystallized bi-carbonate of potash, and decomposes it by its own weight of lime; this not only affords a potash free from the above mentioned impurities, but also from caustic soda, which often exists in it as usually prepared.

*Hydrar. Oxid. Nig.* This preparation, as usually made, consists, according to Mr Donovan, of a mixture of metallic mercury and its per-oxide, along with the protoxide; a pure oxide may, however, be obtained by using very finely levigated calomel and a great excess of potash. But it is at best a very uncertain preparation, as a mere exposure to light or to a very gentle heat will decompose it into metallic mercury and peroxide.

*Zinci Oxidum.* In making this oxide by precipitation with ammonia, care must be taken not to use any excess of ammonia, as there will, in that case, be a loss of some of the precipitate by its being re-dissolved by the free alkali.

*Hydrar. Cyanuretum.* Chevallier (Manuel du Pharmacien) considers the most economical method of obtaining this salt is by decomposing a per-sulphate of mercury by the ferrocyanate of potash, filtering the solution whilst hot, in order to separate the iron of the ferro-cyanic acid, and crystallizing the cyanuret of mercury by refrigeration. From 100 of ferro-

cyanate of potash and 200 dry per-sulphate of mercury, he obtained 145 pure, well crystallized cyanuret.

*Argenti Nitras.* As this salt is decomposed by a gentle heat, the operation of fusing it always causes the formation of oxide of silver, which discolours the preparation. Mr M'Kenna of Dublin (Kane's Elements of Pharmacy) has obviated this, and obtained a lunar caustic of a dazzling whiteness by adding a little nitric acid just as the mass has fused, or by throwing in a few unwashed crystals, containing some acid in excess.

*Hydrar. Oxid. Rubrum.* This oxide, when prepared by nitric acid, often contains some per-nitrate, from the heat not having been long enough continued. The formula given in the Pharmacopœia will seldom afford a preparation having a fine crystalline appearance. To effect this, the nitrate of mercury should be in small crystalline grains, as left by a tolerably slow evaporation to dryness. These should be placed in a matrass and heated till oxygen begins to come over, when the matrass is to be accurately corked, and very slowly cooled. Chevallier lays great stress on these last two points.

*Magnesia.* Robinet's process for calcined magnesia, it is stated by Kane (O. C.), gives a heavy magnesia like Henry's, and is very economical. He forms a dough-like mass of the carbonate of magnesia and water, presses it strongly between folds of linen, places these masses in a crucible, and calcines as usual. Thirty ounces of magnesia may be made by this process in a vessel which would hold only twelve of the dry carbonate.  
R. E. G.

*Carbonate of Magnesia.* The soft and satin like feel of carbonate of magnesia is in a great measure dependent on the precipitant employed to decompose the sulphate. Epsom salts precipitated by the carbonate of potash, never yields a magnesia that is soft and soapy to the touch, whilst, on the contrary, when carbonate of soda is used, the magnesia will possess that quality, and also affords a much handsomer

calcined article, which, if prepared as above directed, will bear a close resemblance to that of Henry.

*Solution of Ether.* The small proportion in which ether can be dissolved in an aqueous vehicle, has always been a great objection to the employment of this energetic stimulant and anti-spasmodic in mixtures, as from its low specific gravity it will rise to the top of the bottle in a very short time after the mixture has been well agitated, and hence is apt to be administered in too large doses at first, whilst, on the contrary, the residue will contain little or none of it. We are indebted to Dr B. H. Coates of this city for the knowledge of a very simple process, by which this difficulty may be overcome, and the ether kept in perfect suspension in almost any liquid without any change of its therapeutic properties. This consists in adding to every drachm of the ether a small portion of spermaceti, say two grains, and rubbing in a mortar until the spermaceti is perfectly dissolved; then adding the water or mixture, stirring incessantly, and passing it through a piece of muslin to separate the spermaceti. This will give a perfect, and we believe permanent, solution of the ether. Wax, sweet oil, stearine and camphor will afford the same result, though with the camphor the solution is not so perfect as with the other articles. This fact, which may be new to many practitioners and apothecaries, deserves their particular attention. An officinal solution of ether might be kept in the shops, *ad rem natam*, were it not for the property of the ether, when in contact with water, of being converted into acetic ether. Experiments might be made to ascertain how long such preparations might be kept without alteration.

E. D.

*Coxe's Hive Syrup.* The directions given by Dr Coxe in his Dispensatory for this preparation, are to boil to six pounds, *or to the consistence of a syrup*. The last clause is the important one in the sentence, and its omission in the Pharmacopœia leads to inconvenience. The truth is, the direction

of Dr Coxe to boil down to six pounds is altogether deceptive. It must be boiled down to four pints, which gives a syrup of the proper specific gravity. When made according to the formula in the Pharmacopœia, it has only the specific gravity of  $22\frac{1}{2}$  of Baumé; when boiled down one third more, it measures  $30^{\circ}$ , which is about the proper strength of syrup.

The *Distilled Waters* are imitated in the Pharmacopœia by triturating the essential oils with magnesia and then mixing with water. It is a very convenient and cheap mode of making highly flavoured waters which do not spoil. There is one caution, however, to be observed in their use. A small quantity of magnesia is dissolved, which is sufficient to decompose minute quantities of the salts of morphia, strychnia and quinia. I have frequently found the morphia crystallized in phials which had contained sulphate of morphia, dissolved in the peppermint water of the new Pharmacopœia. A drop of elixir of vitriol to an ounce of the water is sufficient to prevent this.

*Plasters.* It is now understood that the plasters are true soaps, of which the pro-oxide of lead is the base. The general opinion among chemists is, that the protoxide only can be used, and that water is essential to the preparation of plaster. This, however, is not uniformly the case. If the deutoxide of lead is used, a true plaster can be formed without water. The oxide furnishes oxygen for the acidification of the oil, and is reduced to the state of protoxide, in which it exists in the plaster. The plasters made in this manner are, however, all of a more or less deep brown colour. D. B. S.

*Specific gravity of powders insoluble in water.* Weigh out 100 grains of the powder, whose specific gravity is to be taken, and put them in a specific gravity bottle (which should contain 1000 grains of distilled water when filled), then fill the bottle with distilled water, and ascertain the weight of its contents, which deducted from 1100, will give the quantity of water displaced by the 100 grains of powder, and as the quan-



tity of water displaced by any substance heavier than water is equal to the bulk of the substance immersed, the relative specific gravity of the substance to water is easily ascertained. Thus if 100 grains of a powder be put into a specific gravity bottle as above, and the bottle filled with distilled water, and its contents should subsequently weigh 1060 grains, it is evident that the 100 grains of powder have displaced 40 grains of water, whence the specific gravity of the powder is easily deduced. As 40, the weight of the water displaced, is to 1000, the specific gravity of water, so is 100, the weight of the powder, to 2.500, its specific gravity, or algebraically thus,

Let  $a$  be the weight of the water displaced,

$b$  the sp. gr. of water,

$c$  the weight of the powder,

Then will  $y$  be the true sp. gr. of the powder, i. e.  $\frac{b \times c}{a} = y$ .

To make good *acetic acid* without distillation and free from the sulphurous smell which generally contaminates it when made from a dry acetate and sulphuric acid, the following method may be successfully employed. To 98 parts acetate potass add 150 parts crystallized tartaric acid in powder; mix them well, pour on them 18 or 27 parts of boiling water, and press the mass, when 60 parts acetic acid, sp. gr. 1070, will be obtained. The remaining powder will, by digestion in water, yield a dilute acid applicable to the purposes of distilled vinegar.

The acetic acid thus made surpasses Henry's in grateful flavour, and its smell is perfectly free from the sulphurous one which Henry's possesses.

*Morphine.* The French morphine contains one-third its weight of narcotine, which can be detected by fusing some over a candle in a piece of paper; if pure, it will not fuse at a degree of heat below that at which the paper browns; if impure, it will fuse like grease. The best method is to dissolve it in sulphuric acid and crystallize it, when, if pure, it will yield white crystals to the last drop of the mother liquor, if

impure, a gummy mass after the first crystallization will occur, which I thought was owing to the effect of the heat employed in its evaporation; but subsequent examination has proved that it was owing to the presence of narcotine.

Sulphate of morphine is, when pure, beautifully white, not at all possessed of a brown shade like that of the French, but is analogous in appearance to sulphate of quinine when in crystals.

*Labarraque's Liquor.* If this liquor be properly prepared, it will stand at 12 to 12.5 Baumé's areometer. A.

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ARTICLE XXXI.—*On Labarraque's Liquid.* By C. C. C. Cohen.

A desire that error, apparently sanctioned by authority, should not go forth uncontradicted to the world, and not the mere wish of cavilling, has induced me to pen this communication, in order to rectify the erroneous impression that has already resulted from some inadvertent misconception of the highly talented author of the article entitled "On the Chlorides in general, and especially on those of the Oxides of Calcium and Sodium," page 272, first volume of the Journal of the Philadelphia College of Pharmacy.

With the remarks on chloride of lime, with the exception of the theory there advocated, I entirely agree, but with those on the manufacture of Labarraque's liquor, I will give the particulars of my dissent, and point out where some misconception in the writer has made a material difference in the opinion of Faraday on this celebrated compound. Previous to my doing so, it may be necessary to state that a solution of indigo is not,

nor cannot, by any possibility, be a test of the quantity of chlorine contained in a liquid, and I refer as a satisfactory proof to the article of M. Marozeau, *Annales de Chimie*, xlvi.

The author of the essay referred to (Mr Durand) observes of Mr Faraday that, "in order to obtain this preparation in a state of purity, he recommends this chloride to be made with caustic soda or common subcarbonate of soda, but with a great excess of chlorine, in order to displace the whole of the carbonic acid."

How Mr Durand could have made this error I know not, but certain it is, that Mr Faraday's article, *Journal of Science*, 1827—28, contains at the close of it a decided contradiction to this paragraph, for he states that "Doctor Granville, who had given an account of this liquid in a previous number of the journal, had unfortunately mistaken Labarraque's directions, and by passing chlorine through to complete saturation, had failed in obtaining Labarraque's really curious and very important liquid.

In the commencement of his experiments, Mr Faraday uses certain proportions of common salt, manganese, &c., furnishing a definite proportion of chlorine to a solution containing a definite proportion of carbonate of soda; he next uses an excess of chlorine and drives off the carbonic acid gas of the carbonate of soda, and then operates upon the two solutions alike, and points out their respective chemical differences, which I have thrown together in a synoptical form, and have placed the peculiarities of the two liquids, viz. that made after Labarraque's suggestion, containing as much chlorine as a solution of carbonate of soda could absorb without being decomposed, and without having a particle of carbonic acid displaced, and that made by passing chlorine in excess through a solution of carbonate of soda, until its carbonic acid was displaced, and until the liquid would absorb no more gas. The following are the results. I have not related the experiment, for as each was treated in the same manner, the results will give sufficient indication of their difference.

*Labarraque's Liquor, formed with a definite proportion of Chlorine.*

*Chloride of Soda, formed by excess of Chlorine.*

Taste sharp, saline, scarcely at all alkaline, a persisting biting effect upon the tongue.

Taste extremely irritating, caustic and strongly alkaline.

Evolves but a slight odour of chlorine.

Exhales a powerful and almost insupportable odour of chlorine.

On being heated evolves no chlorine.

On being heated evolves chlorine, assumes a dingy appearance, after which the taste is saline and astringent.

Furnishes on evaporation a saline mass which has the same taste and smell as the solution.

Evaporated to dryness furnishes common salt and chlorate of soda, and tastes dissimilar to the solution previous to its being heated.

Contains no common salt nor chlorate of soda. Contains all the carbonic acid of the carbonate of soda.

Contains but a very small proportion of the original carbonic acid of the carbonate of soda.

On being acted upon with a view to expel its chlorine, Mr Faraday found that 59 parts out of 60 of the chlorine was evolved, all of which he consequently inferred was available as a disinfectant.

The greater part of the chlorine it contains has entered into composition with the soda and its metallic base, and is consequently not available as a disinfectant.

The other peculiarities of the liquid are perfectly related by Mr Durand in his essay, and I only wonder how his error could have originated. To conclude this portion of the subject, I will add that Turner's theory of Labarraque's liquor is not in compliance with Faraday's results, for Faraday speaks of the carbonate of soda acting as a simple substance in relation to the chlorine, whence I opine that chloride of carbonate of soda should be its scientific name, for that would state the true composition of this extraordinary fluid. For it is certain, however paradoxical it may appear, that the solution of the carbonate of soda which contains the exact quantity of chlorine, will disinfect much more powerfully than a solution of the same salt through which an excess of chlorine has passed, and the reason is found in the fact "that if chlorine be passed through the liquid in such quantities as to decompose the carbonate of soda and drive over the carbonic acid, a solution is obtained containing chlorine and pure soda, which (either on exposure to the atmosphere or standing a short time), in consequence of changes well known to chemists, becomes common salt and chlorate of soda, and possesses no disinfecting powers,



although six times as much chlorine then exists in the solution as in that of Labarraque's—while Labarraque's, on exposure to air, evolves all the chlorine it contains, and none enters into the composition of the remaining salt, and consequently, all the chlorine it contains is available for the purposes of disinfection.

I must differ from Mr Durand, in the supposition that the carbonate formed by the spontaneous evaporation of the liquid chloride of soda (Labarraque's liquor, I presume) is principally produced by the carbonic acid of the atmosphere, the more especially as I find that chloride of lime exposed to the air does not become a carbonate but a chloride of calcium. I have exposed a filtered solution of chloride of lime to the air for a month without any precipitation occurring.

A word or two in reference to Payen's process shall close this article. It is impossible that Payen's process can produce Labarraque's liquid, inasmuch as by the double decomposition ensuing, a portion of the carbonic acid is withdrawn from the soda in combination with the lime, and it is impossible to make a solution in this way, without containing a pretty large proportion of muriate and chlorate, independent of the fact, that the solution can never be as concentrated as Labarraque's. I forgot to remark that Faraday's solution differs from Labarraque's only in being more concentrated, for his solution of carbonate of soda is one-fourth stronger than Labarraque's, and although he uses considerably more materials for generating his chlorine than Labarraque, it must be recollected that he allows one-third to be absorbed by the water used in washing his gas, and that if this deduction be made, it will be found in the exact quantity in proportion to the soda as Labarraque's. A neglect of this sort has produced unpleasant effects here, as for instance, a person of the name of J. Boston made some, according to Labarraque's process, as directed by Faraday, and bottled it as soon as possible after it was made; a gentleman who purchased a bottle, on his arrival homewards opened it, when the "acid fluid," to use his own expression, was ejected

with considerable force into his eyes, nose and mouth, and produced a high degree of inflammation, which was some days in subsiding; an effect which could not by any possibility take place, except in a badly prepared chloride. I hope the convention will add a formula for making Labarraque's liquid, so that the article sold under that name shall at least be an uniform compound.

## SELECTED ARTICLES.

ARTICLE XXXII.—*Analysis of the Liquid Styrax from America.* By M. Bonastre.

THE liquid styrax from America is obtained from the *Liquidambar styraciflua*, a tree belonging to monoecia polyandria, and to the natural family of the amentaceæ. When recently collected, it is also called liquid amber, from its fluidity and the peculiar yellow colour it possesses. It has an oleaginous appearance, is more or less transparent, a character which, however, depends on the degree of atmospheric temperature. Its taste is acrid, pungent and extremely aromatic. Its consistence is variable, being more or less fluid according to the temperature to which it is subjected; for example, at 50° Fahr. it possesses the fluidity of copaiba, and has somewhat the transparency of that balsam. At the freezing point it becomes very thick and loses its transparency. At a few degrees below this, it is almost entirely opaque, and appears to have a tendency to crystallize; this is owing, as will be seen, to one of the immediate principles which constitute it, and which is very remarkable. Its specific gravity is inferior to that of distilled water, for if a few drops be cautiously poured on that fluid, they spread and remain on the surface. The contrary takes place if it be dropped from a height; in this case it falls to the bottom and does not rise. Only about three-fourths of it were dissolved by alcohol at 33°. This solution feebly and slowly reddened litmus paper. The portion which

was not attacked by the alcohol, was a whitish mass, composed of a great quantity of crystals. Sulphuric ether dissolved it wholly; the solution, however, was not entirely transparent.

*Analysis.* 100 grammes were introduced in a glass retort with 1000 grammes of filtered water, and subjected to distillation. This operation, which was carefully performed at different times for thirty-six hours, renewing the water as it passed off, afforded 7 grammes of a volatile oil, having the following properties:

*Volatile oil.* The volatile oil of the liquid styrax is white, diaphanous, and as colourless as distilled water. It is lighter than water, but heavier than alcohol at 33°. Its odour is strong and penetrating. Its taste is acrid, burning and caustic, leaving a disagreeable taste in the mouth. It is very slightly soluble in distilled water, but nevertheless imparts a tolerably strong taste to that liquid.

If the distilled water which was employed to obtain this oil be evaporated in a retort, by a gentle heat, two products will be obtained: 1st, at the commencement, a very aromatic transparent fluid of a strong taste; 2nd, towards the close, and as a residue, a whitish, concrete, inodorous substance, of the consistence of yellow wax, and which, dissolved in ether, reunites by the evaporation of the menstruum in numerous small globules, an almost certain indication of a crystallizable principle. The previous addition of an alkali does not aid the separation of these two products.

Alcohol at 33° only dissolves about one-third of the volatile oil; this solution is always somewhat turbid. It is perfectly neutral, having no action on either litmus or turmeric paper. It is completely soluble in sulphuric ether, and the solution is transparent; concentrated acetic acid does not entirely dissolve it. At 32° Fahr. it completely congeals, beginning at the lower part. In this state it forms a semi-transparent mass like camphor, but does not present a sufficiently distinct crystallization to determine the forms. Nevertheless, when the temperature is raised a few degrees, it is perceived that the



portion of oil which first becomes fluid, leaves a semi-concrete mass, which appears to be formed of the union of numerous fine silky fibres.

If this semi-concrete matter be placed on blotting-paper, the fluid part of it is absorbed, leaving a white opaque substance, destitute of both smell and taste, and which does not appear to present any traces of crystallization. If a solution of caustic potash be added to it, and the whole subjected to distillation, almost all the volatile oil passes over, leaving in the retort only a small residue of concrete matter united or combined with the potash. This combination can be destroyed by means of an acid, and the residuary concrete portion obtained in the form of a very white powder. Exposed to the action of oxygen gas, over a mercurial trough, for a month, at a temperature of about 40° Fahr., there was no absorption of the gas.\* Subjected to the action of boiling nitric acid, it was converted into a thick resinous matter, of a gamboge yellow colour; but this action did not give rise to the formation of benzoic acid.

Thus the volatile oil of liquid styrax does not absorb oxygen, nor is it transformed into benzoic acid under the same circumstances as produce these phenomena in the volatile oil of bitter almonds, according to the interesting experiments of our colleagues, MM. Robiquet and Boutron-Charlard. It results from these different experiments, that this volatile oil is composed of at least two substances: 1, of a portion of very fluid and very odorous oil, of a strong taste, and neither uniting with the alkalies nor with oxygen gas; 2, of another portion which is concrete, inodorous, almost tasteless, and appearing capable of uniting with the alkalies. This oil, then,

\* The difference in these results induced me to try the following experiment. The volatile oil was introduced under a bell glass filled with oxygen gas, over a mercurial trough, and a small piece of potash added; as no action appeared to be excited, the whole was slightly heated; this occasioned a violent explosion and fracture of the glass.

in some respects resembles those of neroli and cinnamon, so well described by our learned associate M. Boullay.

It still remained to ascertain the nature and proportion of the different elementary principles constituting this oil. M. Henry, Jun. was kind enough to undertake this, and he accomplished it with every possible care and precision, with the following results: 100 parts of the oil gave

Carbon	89.25
Hydrogen	10.46
Oxygen	00.29—100.

It is probable that this small proportion of oxygen was only accidental.

*Volatile substances contained in the distilled water.* The quantity of water necessary to obtain 7 grammes of the volatile oil, amounted to 5 litres and a half. The distilled water was white and slightly opaline, very odorous, and having a marked taste of styrax. It did not redden litmus paper. 125 grammes agitated with ether afforded 5 grains of a sebaceous, grayish substance, composed, as above mentioned, of an odorous part and one which had no smell. The whole amounted to 11 grammes 1 decigramme.

*Liquid residue of the distillation.* The fluid that remained in the retort weighed 500 grammes; as it was somewhat turbid, I filtered it. It was of a deep yellow colour, with a weak bitter taste, and a faint smell somewhat resembling that of the sweet vernal grass (*Anthoxanthum odoratum*). It did not redden litmus paper, or did so at least in a very slight degree. This surprised me the more, for having heretofore analyzed some old liquid styrax, I found that the slightest boiling of it in water afforded on cooling a tolerably large deposit of benzoic acid.\*

\* Some old liquid styrax from the Mississippi, which I analyzed, was so studded with benzoic acid, that it appeared to be entirely formed of it. The specimen was procured through the kindness of M. Robiquet from the cabinet of the School of Pharmacy of Paris.

I evaporated the fluid by a low heat, and observed that as the evaporation took place, there was a formation of a whitish crystalline substance, sometimes of a spherical form, which agglomerated and fell to the bottom of the vessel. I occasionally filtered, to separate the crystals, and obtained 5 grammes 3 decigrammes.

*Properties; crystalline substance soluble in water and alcohol.* This matter was placed on a filter and washed with a small quantity of cold water. A. About one half was macerated in twelve parts of cold water, which dissolved about one-fifth. This solution, when concentrated, was grainy and of a deep yellow colour. It reddened litmus paper. The other portion, which had resisted the action of the cold water, was dissolved in boiling water and immediately filtered. The crystals that formed on cooling were scarcely coloured. Their smell and faint taste resembled that of the anthoxanthum or melilot. Purified by animal charcoal, they became beautifully white and brilliant, resembling benzoic acid. Nevertheless, their successive solutions in water reddened litmus paper less and less, and finally had no action on it; when placed on burning coals they volatilized and diffused an agreeable balsamic odour. B. The other half was treated with cold alcohol; this menstruum dissolved a part of it; the remainder was treated with boiling alcohol, which also afforded beautiful, brilliant, white crystals. It is remarkable, that when the first impure crystals are removed by washing either with water or cold alcohol, that the subsequent solutions of the purer crystals scarcely redden litmus paper. When examined by a microscope, they are found to be four-sided pyramids.\*

*Colouring matter.* The water, both of the residue and washings, when evaporated, left a very dark yellow matter which congealed on cooling, and which weighed about two grammes and a half.

\* Has not this crystallizable substance some relation to *Coumarine* (obtained from the Tonka bean)?



*Soluble or oleo-resin.* This substance was of a somewhat oleaginous appearance, of a soft consistence, and, nevertheless, adhered to the fingers like a fluid resin. It is perhaps formed of two substances, and may take the place of the soluble resin of the true balsams. It dissolved in highly rectified alcohol, as well as in ether. The alkalies, and even their sub-carbonates, united with it and dissolved it in tolerably large proportions, forming alkaline *savonules*, a product which I was unable to examine in a satisfactory manner, owing to the fracture of the capsule.

*Liquid Styrax after distillation.* Notwithstanding the prolonged ebullition of the liquid styrax in water (40 hours), and consequently the presumable absence of all volatile oil, it still preserved a very soft consistence; finally, after several other partial ebullitions in an open vessel, its consistence not becoming firmer, I abandoned this experiment. I treated the residue with quick lime mixed with water, boiled, filtered and decomposed it by an acid. The whole was placed on a filter and dried, then introduced into a glass tube and sublimed; this furnished beautiful white and brilliant needles of benzoic acid. This acid had the smell of the anthoxanthum, and although it reddened litmus paper, its taste was much less pungent than that of the same acid obtained from old liquid styrax, from which the volatile oil had not been separated.\* I again boiled the residue with lime, but only obtained a few atoms of benzoic acid.

*Insoluble crystalline portion.* It has been mentioned that cold alcohol did not dissolve the whole of the liquid styrax, but that rather more than a quarter remained unacted upon, presenting the appearance of a whitish mass formed by the union of an innumerable quantity of different sized crystals. These crystals, also, were in the form of tetrahedral prisms, larger

\* The pungent taste of benzoic acid, obtained from gum benzoin, and which is felt so strongly in the throat, is perhaps owing to the presence of a volatile oil of this nature; for in old balsams, as in old styrax, for instance, it is difficult to form an idea of the pungent taste of the volatile oil



than those spoken of above. They were wholly insoluble in both cold and boiling water. Cold alcohol dissolved only a very small part. Subjected to the action of boiling alcohol and then filtered, numerous crystals united in spherical masses are obtained, which appear to be similar to those found in the tincture of liquid styrax, and which I called *Styracine*. Thus united, the crystals of styracine are of the consistence of yellow wax. Their smell is analogous to that of vanilla. They are almost tasteless. The form of the crystals is tetrahedral prisms. They fuse below the boiling point of water. They have no action on test papers.

From a comparative examination, which is too long to detail, I became convinced that in the recent liquid styrax, the volatile oil exists in some quantity, whilst the benzoic acid does not exist, or at least in a very small proportion, in a free state; and that the contrary is the case with the old article. Nevertheless, from the experiment with the volatile oil and oxygen gas, it does not appear that the benzoic acid is formed by the mere oxygenation of the volatile oil of this balsam. I must, however, admit that my experiments on this point, have neither been sufficiently varied, nor made with sufficient quantities to determine this important question. Let this be as it may, I must recur to the new principle, *Styracine*, which I had already announced as occurring in the tincture of liquid styrax, and which I have been so fortunate as to also find in the recent balsam.\*

\* M. Henry, Jun. having also been kind enough to make an ultimate analysis of the pure crystals of styracine, dried in vacuo, they afforded him the following results:

Carbon,	.	.	76.2728
Hydrogen,	.	.	5.5032
Oxygen,	.	.	18.2240
			—————100.000

Thus it appears that styracine contains only two per cent less oxygen than benzoic acid does. Nevertheless, it does not redden litmus paper, and is wholly insoluble in boiling water.\*

\* Can it be a kind of hypo-benzoic acid, or a benzoate of bi-carburetted hydrogen?

In fine, it is evident that this balsam is composed of several principles crystallizable at different temperatures, and of other principles, which perhaps are not crystallizable, as the oleo-resin, though my experiments on this point are not satisfactory. The composition of 100 parts are:

	Gram.	Decigram.
1. A colourless volatile fluid oil, congealing at 32° Fahr.	7	
2. A semi-concrete matter contained in the distilled product, and separated by ether,	11	1
3. Benzoic acid,	1	
4. Crystallizable matter soluble in water and alcohol,	5	3
5. Yellow colouring matter,	2	$\frac{1}{2}$
6. Oleo-resin,	49	
7. Styracine,	24	
	—	— 99.4 $\frac{1}{2}$

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ARTICLE XXXIII.—*Observations on Solutions of Opium, treated with a watery solution of Lettuce. By E. Mouchon, Jun. of Lyons.*

The phenomena produced by the addition of certain quantities of the watery solution of lettuce to a watery solution of opium, are so remarkable, as was first remarked by M. Boullay, that we might be naturally disposed to suppose that a great deterioration of all medicinal agents subjected to its influence must be the result. Nevertheless, it appears evident to me, that this action may take place without a sensible loss

of morphine, and I am much deceived if the facts I am about to detail will not fully justify my opinion.

Desirous to know, in the first place, whether it was indispensable to make a watery solution of opium to give the lettuce water the faculty of precipitating the whole of the principles on which it acts, I subjected opium and its extracts, without any intermedium, to the action of distilled lettuce water: after filtering and evaporating these solutions, a manifest turbidness and precipitation took place on fresh additions of the lettuce water, whilst on pouring it into solutions of opium prepared with common water, to which proper proportions of lettuce water had already been added, then filtered and evaporated, but little or no turbidness was occasioned. It is therefore manifest that the precipitation produced by lettuce water in solutions of opium is complete only in cases where this body has been dissolved in common water; and it also appears certain, that it is requisite to employ determinate proportions of these two liquids to produce the full effect. Those which have appeared to me the best calculated to ensure the desired end, will be indicated in the following experiments.

Three pounds of opium of good quality, reduced to powder, were divided into three equal portions, and subjected to the following treatment to extract the morphine:

*With common water.* After having exhausted a pound of opium by two macerations of twelve hours each in eight parts of water, I filtered and subjected the solution to a prompt evaporation to bring it to two degrees of the areometer; having then added an ounce of purified animal charcoal, (under the influence of which decolorising substance it was permitted to remain for twelve hours, taking care to shake it frequently), and again filtered, neutralization effected by means of liquid ammonia, and some hours afterwards a slight excess of alkali was added to the decanted liquid, and the mixture then left at rest for twenty-four hours. The precipitate, washed with cold water, was then subjected to the action of eight ounces of

alcohol at 8° for a short time, then dried, and triturated with an equal weight of animal charcoal, and afterwards treated with boiling rectified alcohol. After filtration, I permitted crystallization to go on for some hours, then decanted the fluid, washed the crystals till the washings were tasteless, and dried them. The morphine, thus prepared, weighed seven drachms twelve grains, besides what might still remain in solution in the alcohol, in the washings and in the charcoal; it had all the characters of purity, except the presence of a little narcotine.

*With affusions of common cold water, after Cornet's plan.* A second pound of opium was deprived of its soluble principles, according to Cornet's plan, by three affusions of cold water, and concentrated to the consistence of a soft extract. The fluid, filtered some hours after the last addition of water, four pounds, marked 4°, was subjected, like the preceding, to the decolorizing action of animal charcoal, and in fine, the operation was continued as in the previous experiment. The result was six drachms forty-four grains of pure morphine.

*By lettuce water.* A third pound of opium was dissolved in four pounds of cold spring water, and the mixture frequently shaken during twenty-four hours. Twenty-four pounds of lettuce water were added, which, having almost instantly caused a very abundant precipitate, I permitted the solution to remain undisturbed for two hours, then filtered it, and reduced it by a rapid evaporation to four pounds; in this state it marked two degrees, and was not rendered sensibly turbid on the addition of cold water. After this, I operated in precisely the same manner as in the preceding experiments. I this time obtained eight drachms thirty grains of morphine, endowed with all the physical characters which denote a pure state of this organic substance. What can we conclude from these three experiments, except that the action of lettuce water on the solutions of opium takes place only at the expense of principles foreign to the combination of morphine, and



in a manner nearly analogous, except more powerfully, to that of common water. This opinion appears to be supported by the following experiments.

*Solution of Cornet's extract of opium.* A drachm of Cornet's opium, dissolved in four drachms of spring water, produced, in a short time, a greyish precipitate approaching to black, on the addition of three ounces of freshly prepared lettuce water, the virous smell of the opium giving way to that of the lettuce. After remaining undisturbed for some hours, the fluid became transparent, and of a somewhat reddish colour. Being filtered and evaporated to a fourth by a gentle heat, it lost none of its transparency, and on the addition of three times its weight of lettuce water, it did not become turbid, or let fall any precipitate. On being a second time evaporated, and then common water added to it, no change was produced.

*Solution of Josse's extract of opium.* A rather larger precipitate on the addition of the lettuce water. The physical characters of this precipitate were similar to those already spoken of. The solution itself was of a lighter colour and somewhat less transparent; the only smell was that of lettuce. Evaporated to one fourth, it did not become turbid, it remained limpid, and furnished no precipitate on the addition of three times its bulk of lettuce water. The same was the case on its being again evaporated, and then common water added.

*Solution of opium of commerce.* This solution, made in the way and in the same proportions as the two preceding, gave in a short time a much more abundant precipitate, of an almost ash grey colour. The liquid was much less coloured than in the second experiment, being somewhat opaline. The same phenomena took place as have already been mentioned on its being treated as in the foregoing experiments.

M. Boullay having remarked that the precipitate resulting from a similar mixture was less abundant than that furnished by the gummy extract, this third experiment is extraordinary,

if this anomaly is not owing to the very great difference that occurs between the opiums of commerce.

Borage, mallow, lily and pellitory water, used precisely in the same way, produce nearly the same results as lettuce water. The same was not the case, however, with plantain, elder, linden or balm water, which, on being added after the concentration of the solution, caused a slight turbidness, and produced a greater or less precipitate.

From what has been said of the property of distilled lettuce water to precipitate the whole of the principles which it is wished to separate from the opium, I think it would not be unadvisable to apply it to the preparation of the extract of opium, and the following appears to me to be the best mode of procedure. I took

Opium reduced to small pieces	500 gram.
Spring water	2000

Juice of the stems of the *Lactuca capitata* 12,000

The opium was macerated in the water for twenty-four hours, and the mixture frequently stirred. Having ascertained that the opium was completely dissolved, I added the lettuce water. After permitting it to remain undisturbed for two hours, I filtered it. Subjected to a rapid evaporation in a water bath, in two basins, and continually stirred, the liquid was reduced to a fourth. The evaporation was then continued in one vessel, and in the water bath over a gentle fire to a pillular consistence.

I have thus several times prepared the extract of opium. The product has appeared to me to be eminently endowed with purely sedative and hypnotic qualities, at least as fully so as those of the extract procured by the most esteemed methods. The quantity of extract obtained has always been six ounces to six ounces and a-half.

By the mere affusion of lettuce water, to which recurrence must be had in following the indications I have laid down, so abundant a precipitate is produced, that the eliminated principles exceed in weight those which result from several affusions of common water; a single trial will fully confirm the

truth of this. Having collected and carefully dried the precipitated matter, I found it weighed seven ounces.

The same precaution having been used in the preparation of Cornet's opium, I only obtained five ounces six drachms of the precipitates, of which four ounces four drachms of insoluble matters remained on the filter after the two macerations, and one ounce two drachms of a blackish resinoid substance were the product of the three affusions:

Previous to these experiments, I had the curiosity to push the operation to an eighth affusion of water, and obtained as a result, six ounces two drachms of extract of opium, and six ounces six drachms and a half of precipitated matters. Certainly all these manipulations cannot be practised without detriment to the properties of the medicine, and yet it is manifest, that two or three affusions are insufficient to deprive opium of all its virous constituents. An examination of the precipitates has also shown the presence of a small quantity of morphine in them, which increases in proportion to the frequency of the affusions; and my experience on this point leads me to believe that by pursuing this operation, the product will be entirely changed, not only from the effect of too long an exposure to the action of the fire, but also from that of the earthly salts contained in the large quantities of water made use of.

It is well known, that the various modes which have been proposed for the preparation of extract of opium, are mainly intended to deprive this therapeutic agent of the oil, the resin and the narcotine which increase its properties. Among these, one only, that of Cornet, appears to rank high, in spite of its inconveniences, as it attains the desired end more completely than the others; nevertheless, it is not, as regards its results, what its author has supposed, for in heating the morphine thus obtained with sulphuric ether, the presence of some narcotine is demonstrated, though in a less proportion than by the process first described in this paper, whilst that

procured by means of the lettuce water is perfectly free from narcotine.

Having taken the six drachms forty-four grains of morphine obtained from the pound of opium treated by Cornet's plan, I extracted from them, by means of two treatments with four ounces of boiling sulphuric ether each time, twelve grains of narcotine in small needle-like and slightly yellow crystals.

The seven drachms twelve grains of morphine extracted in the first experiment, treated in the same way, gave twenty-three grains of narcotine, very pure, though slightly yellowish. As to the eight drachms thirty grains obtained by means of the lettuce water, they only afforded traces of narcotine. From the above it appears

1. That lettuce water exerts no detrimental action on solutions of opium.

2. That it may be a very useful adjuvant in every operation destined to deprive opium of its virous constituents.

3. That Cornet's opium, and probably those of MM. Limouzin, Lamothe and others, which have hitherto been thought to be free from narcotine, contain small quantities of it, and until there be an accordance of opinion as to the effects of this principle, we may reasonably consider all operations as beneficial which are intended to free opium from it, especially as it appears probable that the narcotine is naturally associated with other active principles, especially in the extracts, and may exercise a much more marked effect than isolated.—*Journ. de Pharmacie, Feb. 1832.*



ARTICLE XXXIV.—*Analysis of the Leaves and Fruit of the Tomato (Solanum lycopersicum).* By Professor F. E. Foderé and E. Heckt, Strasburg.

In examining, in September last, the leaves of the Tomato, M. Fodere was struck with their strongly acrid and nauseous odour, which remained attached to the hands. Wishing to examine them more fully, we gathered a quantity, and expressed their juice, which was evaporated over a fire. The fumes which were given out were so powerful that the operator was attacked with vertigo and vomiting, and experienced a sort of intoxication. The thickened juice emitted the same smell, but in a less degree; it became hard from the albumen it contained, and became covered with must; six weeks afterwards this must was removed, and the juice subjected to various experiments; its virous odour had reappeared, and its taste was nauseabond.

1. Mixed with water it restored the colour of litmus paper, reddened by acids. 2. It gave a brick-red precipitate, with hydrosulphate of ammonia. 3. A yellowish white precipitate, with subacetate of lead. 4. An abundant precipitate, with barytes water. 5. An abundant precipitate, with the oxalate of ammonia. 6. The juice was boiled with magnesia, and heated with alcohol at 35°, which became of a beautiful green colour. 7. When filtered it became of a greenish yellow; and, when evaporated to dryness, there was a formation of small bitter crystals, whose nature, from the small quantity obtained, could not be recognised. 8. The matter which remained on the filter was of a beautiful green colour, and when placed on burning coals emitted an animal and ammoniacal odour. 9. This matter, when digested in ether, gave a green tincture, of an odour approaching that of oil of turpentine. 10. This tincture, when evaporated to dryness, left a green fatty matter of a peculiar odour.

Hence these leaves contain an alkaline principle soluble in

water, sulphate of lime, animalized extractive matter, and a colouring substance, which was united to a peculiar volatile oil, soluble in alcohol, and especially in ether; but the small quantities obtained did not permit us to determine the proportions.

*Analysis of the fruits.* This fruit does not ripen as completely in Alsace as in more southern climates. We weighed three pounds which ripened, though not fully, on the chimney piece. After having crushed and expressed them we obtained twenty-four ounces of juice, half of which was filtered, and half subjected to distillation in a glass retort on a sand bath.

The filtered fluid was of a greenish yellow colour, had a peculiar acid taste, and reddened litmus paper. Having subjected it to various reagents, the following were the results: with oxalate of ammonia, an abundant white precipitate; hydrosulphate of ammonia, a greenish precipitate; lime water, no precipitate; hydrochlorate of barytes, white precipitate; subacetate of lead, abundant white precipitate; nitrate of silver, white precipitate; tartaric acid, white precipitate; hydrochlorate of platina, a slight turbidness. From these experiments we began to conclude that the Tomato contained a peculiar acid, which probably is not free, and sulphates and hydrochlorate of potassa and lime.

The marc was afterwards boiled with a sufficient quantity of distilled water, and, having been filtered, there was found an opaque fluid of a yellowish colour, a nauseous odour, like that of the *Solanum dulcamara*, and of an analogous taste, unctuous to the touch, mucilaginous, leaving on the fingers a volatile oil, which quickly evaporated. The above mentioned reagents were tried on this decoction, and gave us the same results, except that instead of reddening litmus paper, it rather destroyed the colour. This circumstance having led us to suspect the presence of an alkali in this fluid, and moreover the experiments of M. Foderè on others of the *Solanæ*, as the *Datura stramonium*, the *Solanum tuberosum*, the *Atropa belladonna*.

*na*, &c. having demonstrated to him that they contained a peculiar acid united to a base, we wished to discover whether this alkali was a mineral or was an alkaloid. With this intention we boiled the liquid of the decoction, and that which had not been boiled, with a certain quantity of magnesia, to see whether any decomposition took place. However, after the filtration of these liquids, treated by the magnesia, the addition of some drops of sulphuric acid gave no trace of acid, but there was an extrication of a vapour of a peculiar and animal smell, consequently indicating the presence of some kind of acid or its principles, belonging to the organic class. The filtered liquids gave evident proofs of alkalinity, as they restored the colour of litmus paper reddened by nitric or acetic acid; and moreover, tartaric acid and hydrochlorate of platina gave some indications of potash. With a view of obtaining this alkaline substance in an isolated state, we evaporated the solutions slowly in a sand bath to dryness, the residue in the capsules was small, of a brown colour, of a very bitter taste, closely resembling the extract of *dulcamara* in smell and taste. This residuum, treated with alcohol at  $36^{\circ}$ , was not dissolved in it in a cold state; on applying heat, the alcohol became of a red brown colour, without however having dissolved all the matter: this alcohol was evaporated, leaving a matter resembling the extracto-resinous substances, of a very bitter taste, and which, on being placed on a burning coal, exhaled an acrid vapour of an animal odour, which irritated the eyes. The marc which remained on the filter after having been boiled, was contracted, hard, of an albuminous nature, and on being put in a crucible and calcined, at first emitted a slight odour of burnt sugar, and afterwards a strong animal smell, with very little residue.

We then proceeded to examine the nature of the marc resulting from *Tomatos* pressed, without having been exposed to the action of the fire; this was the more interesting as the principal taste of this fruit resides in their pellicle; and, as it would have been useless to subject it to the action of distilled

water or alcohol, we decided on calcining it, to observe what phenomena would present themselves, and what residue would be obtained. For this purpose about twelve ounces of it were put into a Hessian crucible and placed in a furnace. The matter first swelled up, and it was long before calcination was effected; during this process a great many cracks took place in the mass, from which there escaped a gas which burnt with a yellow flame, and exhaled a peculiar smell. The crucible was withdrawn from the fire after two hours calcination, and contained only twenty-two grains of a very dirty brown matter, which was very acrid, and attracted moisture; two ounces of distilled water were poured on it and suffered to remain undisturbed for fifteen hours; the solution which resulted was of an acrid and salt taste, restoring vegetable blues, and giving the following results with reagents: copious precipitate with tartaric acid; slight precipitate with hydrochlorate of barytes; none with oxalate of ammonia or nitrate of silver; whence we concluded that these twenty-two grains were composed of sulphate of potassa and free potassa.

Passing next to an examination of the product of the distillation, it resulted that we obtained from the twelve ounces of the juice of the tomato about six ounces of a greenish liquid, having a strong narcotic odour, and covered with a very thin layer of volatile oil, having a taste which was neither acid nor alkaline, but nauseous, having no effect on litmus paper, and consequently containing no acetic acid, which we expected to find from the acid taste of the fruit. This oily layer was extremely volatile, and we could not separate it from the fluid on which it floated. Having evaporated these six ounces of fluid, we obtained a residuum of two grains only, composed of sulphate of soda, hydrochlorate of lime and soda, in which we discovered no traces of iron.

The marc that remained in the retort produced no change on vegetable blues, thus having no traces of the acid which was so perceptible in the juice. The reagents spoken of above produced the same results with it, and after filtration there re-



mained on the filter a curdy, dense substance, which had the smell of dulcamara. The filtered liquor which had not been exposed to heat was evaporated to dryness, then partly redissolved in alcohol, and partly in ether; both were digested for twenty-four hours, to see if there would be any saline precipitate, which did not take place. The alcoholic solution presented at the bottom a circle of brown matter, extremely bitter, which was examined with the microscope after decantation, but no traces of crystallization were perceptible. The same was the case with the etherial solution. The whole was evaporated, and the brown pitchy or resinous residuum, which was very bitter and nauseous, was put on burning coals, when it swelled up and extinguished the fire, emitting a smell of burnt meat which had become putrid.

Hence it appears that the Tomato contains: 1. An acid, which is not the acetic, but of a peculiar character, which is destroyed by heat, and is united in excess to a bitter principle which is probable analogous to solanine. 2. A volatile oil, which it is difficult to separate, and which rapidly evaporates. 3. An extracto-resinous, brown, pitchy, very odorous matter, having the smell of dulcamara, soluble in water, and partly in ether and alcohol. 4. A vegeto-animal albuminous substance, susceptible of putrid fermentation, like that found in all the *solanæ*. 5. A small quantity of muco-saccharine matter, as is manifested by the smell of burnt sugar during the commencement of its combustion. 6. Sulphate of potassa, a small quantity of hydrochlorate of potassa and lime, of pure potassa, and in all probability an alkaloid, as is attested by the great bitterness of the different products, as well as by the acrid vapour which is exhaled on their being burnt, but which is less abundant in the fruit than in the leaves.—*Journ. de Pharmacie*, Feb. 1832.

ARTICLE XXXV.—*Analysis of Balsam of Mecca.* By  
*M. Bonastre.*

The tree that produces the Balsam of Mecca has been known from the earliest ages; the name it bears at the present day among the nations of the East, proves, that the balsam is obtained from the same botanical species as formerly. At the same time, the tree furnishing it has been subjected to strange vicissitudes. The first well established disappearance of this plant was during the siege of Jerusalem by Titus, when the Jews, furious and desperate of their cause, destroyed a great number of the balsam trees, which were then principally cultivated at Jericho. The second epoch occurred on the invasion of Egypt by the Turks, and the continual wars which succeeded, in order to establish the Mahomedan religion in the same country.

One of the first modern authors who has given a circumstantial account of the balsam tree, was Mandeville, who was in Egypt under Malek Maudibron about 1335. This author tells us, that in his time, a grove of balsam trees was cultivated in the neighbourhood of Cairo, and the balsam was extracted by means of incisions made in the tree with a sharp stone, or bone, for fear of colouring the balsam.

The second author was Pellegrino Brocardi, a Venetian traveller, who was in Egypt in 1557. This traveller states, when speaking of the garden of the Matare, that about a gunshot from the wells there was a plantation of these plants, which he says are not trees, but shrubs. Finally, Mackrizi also states that, in the territory of Mataria, which formed part of Aus Shem, he met with this balsam, and that it is derived from a small shrub, which is constantly watered from the wells in the vicinity.

From this and other information, it appears that the plant was cultivated in Egypt in certain gardens, and that the oil or balsam obtained from it was sometimes sold at very high

prices to the Christians, who esteemed it greatly, but most frequently it was sent as a present to the princes of Christendom by the successors of Mahomet.

Linnæus has described two species of shrubs which produce the balsam of Mecca or Judea, and arranged them in his genus *Amyris*, designating them as *A. Gileadensis* and *A. oppobalsamum*, without, however, venturing to affirm whether these plants are not mere varieties rather than distinct species. According to Prosper Albinus, the balsam of Mecca is collected in June, July and August; the bark is wounded and the balsam caught in glass vessels. This balsam is then transported to Cairo or Constantinople, whence it is sent to Europe.

I have been so fortunate as to procure two species of the true balsam. The first was given to me by M. Clarion. This balsam had been presented by the Turkish ambassador to Napoleon for Maria Louisa. The second species was sent me by a naturalist, and it appears from a certificate, which has every appearance of being authentic, that this balsam was presented to Ivan III. emperor of Russia, by the Turkish ambassador. I have also recently procured some balsam of Mecca found in an Egyptian tomb. The first of these is what I subjected to analysis, as it was the most recent and authentic, and from its fluidity contained the greatest quantity of volatile oil, the product I was most desirous of examining. Notwithstanding the various attempts to analyse the balsam of Mecca, it is still difficult to fix with precision on a simple and ready mode of recognizing the purity of this balsam. The oldest plan, which is that of Mandeville, is to pour one or two drops in a glass of water, and if the balsam spreads over the whole surface of the fluid, and can be removed in the form of a white pellicle, the article is considered as genuine. This plan, imperfect as it is, is still pursued in commerce. It may happen, however, from the effects of time, that the balsam may become thick, and acquire greater consistence and weight, in which

case this method would not succeed, although it may be practised on genuine balsam.

*Analysis.* I subjected to distillation 100 parts of recent balsam of Mecca, and after several hours of ebullition in distilled water, obtained 10 parts of essential oil.

*Essential oil.* This is fluid, colourless, perfectly transparent, specific gravity 0.876; its terebinthinate odour distinct, very agreeable, easily developed, and affecting the sense of smell agreeably without fatiguing it. Its taste is strong, without bitterness, somewhat pungent, fragrant, and leaving by its prompt volatilization a certain freshness in the mouth. Its solubility in cold alcohol is about 1 in 12; the solution is somewhat turbid. Sulphuric ether dissolves it in every proportion, and the solution is transparent. Concentrated acetic acid only dissolves it in very small quantities. Cold nitric acid has scarcely any action on it, and hardly colours it. Sulphuric acid attacks it and gives it a saffron red colour. Exposed to a temperature of 32° Fahr. it does not congeal or assume a crystalline appearance. Soda, potassa and ammonia, are not susceptible of combining with it either in a cold or hot state.

*Bitter extract.* The aqueous decoction which remained in the retort was very bitter, but little coloured; on evaporation it left four parts of a brown extract of a remarkable bitterness. This extract was partly soluble in alcohol, and communicated to it its bitterness.

*Examination of the resinous residuum.* The balsam of Mecca from which I had obtained the essential oil was macerated in cold alcohol, until, after several repetitions, the soluble resinous portion was entirely dissolved. This solution reddened litmus paper. Although evaporated till the alcohol had disappeared, this soluble resin never acquired the firmness of the soluble resins of the coniferæ, as those from the Canada balsam and others; on the contrary, it remained in a viscous state without becoming dry and frangible like rosin. Its alcoholic solution reddened litmus paper, and was copiously precipi-



tated on the addition of hot distilled water, which in its turn re-dissolved a small quantity of this acid. Treated with an equal quantity of caustic soda, it only formed an imperfect combination with that salt, and gave no appearance of crystallization. The same was the case with potassa. When these semi-soaps were decomposed by a solution of the per-sulphate of iron, they gave rise to a blue colour. A similar effect is produced in a greater or less degree on the decomposition of other resinous semi-soaps by the same salt of iron. Ammonia, even after a long contact with this resin, has no effect on it. When this resin was subjected to the action of boiling nitric acid, and the heat kept up for a long time, taking care to renew the acid, but a very slight solution of it took place. The concentrated liquid, when permitted to remain undisturbed for several months, gave rise to no crystalline substance. The acid liquid was strongly bitter, and the undissolved portion formed a tenacious and yellowish pellicle.

*Insoluble resin.* This substance, which had resisted the action of the cold alcohol, was of a tolerably firm consistence, was without taste or smell, of a whitish grey colour, became soft on the application of heat, and was with difficulty restored to a dry and pulverulent state. It had no determinate crystalline form, but rather resembled thin scales. It was not phosphorescent by friction. Subjected to the action of boiling alcohol, a small portion only was dissolved, it was immediately filtered, and on cooling there was a separation of whitish and viscid flocculæ, resembling those observed by M. Vauquelin. Cold sulphuric ether dissolved it tolerably well, but a slow evaporation of the solution did not give rise to the formation of any crystals. This insoluble matter appears to me to have a very strong analogy to the insoluble matter of the balsam of the *Bursera gummifera*, and which I have named *burserine*, as it not only possesses the external appearance of this substance, but likewise its principal properties.

These experiments, which were undertaken with but small portions of the recent balsam, do not permit me to deduce

more rigorous results, for the old balsam of Mecca, of which I shall presently speak, having been discovered in an Egyptian tomb, is of course of very great antiquity; this balsam was in fact remarkable for two distinct products, which I was unable to isolate, and to recognize but very imperfectly in the recent balsam. These two products are: 1st, a more developed acid; 2d, an already formed and more abundant crystalline matter. As the balsam of Mecca is excessively rare and dear, it is often replaced in commerce by Canada balsam or balm of Gilead, derived from the *Abies balsamea*. The smell alone not always sufficing to distinguish it, I am of opinion that it can only be recognized by the effects of an alcoholic solution. If the two balsams in question be macerated in rectified alcohol, and after several repetitions the solution be evaporated, it will be remarked:

1. That the soluble resin of the balsam of Mecca being always soft, or at least pasty, in no respect resembles the soluble resin of the Canada balsam, which, when deprived of its essential oil, becomes dry and frangible like rosin.

2. The insoluble resin of the balsam of Mecca, from the experiments of M. Vauquelin, and under the circumstances in which he operated, that is, by subjecting it to the action of boiling alcohol; this insoluble resin, I say, being always viscous, and deposited in flocculæ of some tenacity, differs essentially from the insoluble resin of the Canada balsam, which, according to my experiments, is always dry and pulverulent.

Hence, we may lay it down as certain, that the simplest method of recognizing the purity of the balsam of Mecca is by means of alcohol, as this fluid permits us to observe the viscous or soft nature of the two resinous matters.

From the above it is evident that the balsam of Mecca, by the various principles that constitute it, is subject to the same organic laws as many of the resins of the terebinthinate class, and that in arranging these principles in the order in

which they presented themselves in the analysis, we find that the balsam of Mecca is composed of

Viscous soluble resin,	70
Viscous insoluble resin (burserine),	12
Very fluid essential oil,	10
Bitter extract,	4
Acid matter,	3
Ligneous impurities,	1

— 100

*Journ. de Pharm. Feb. 1832.*

ARTICLE XXXVI.—*On the Nitrate of Soda of Commerce.*  
By M. Le Canu.

A note of M. Mariano de Rivero, inserted in the 18th volume of the *Ann. de Chim. et de Phys.* page 442, made known the existence of a large deposit of nitrate of soda, in the district of Tarpaca and Atacama, near the frontiers of Chili. This deposit, which is 50 leagues in extent, and in which the nitrate is found almost pure, must have been worked soon after its discovery, for we find in the "*Nouveau Dictionnaire des Sciences Naturelles*," article "Nitrate of Soda," that since the year 1820, more than 60,000 quintals of the nitrate had been received at the port of Conception in Chili, and that of Yquique in Peru. Nevertheless, it appears that, notwithstanding its great importance, no attention was paid to the discovery of M. de Rivero in France, since, until very lately, the nitrate of soda remained unknown in Paris. It has only been within a few months past that this newly imported article has appeared in the market in any considerable quantities, and that the manufacturers of Marseilles have spe-

cially drawn the attention of government to it. They have been afraid, and not without reason, that the substitution of nitrate of soda for nitrate of potash in certain processes, and especially in the making of nitric acid, would deprive them of sulphate of potash, and consequently render it impossible for them to compete in the manufacture of alum with other establishments in France.

I will not at present undertake to examine how far the substitution of nitrate of soda for nitrate of potash, in the manufacture of nitric acid, would influence the making of alum, or act on the various manufactures in which the nitric acid is made use of. Nor shall I investigate whether the low price of the nitrate of soda might not compensate the manufacturers of nitric acid for the disadvantage they would suffer from obtaining a residue of sulphate of soda instead of sulphate of potash, which bears a much higher price. But as it is certain that the existence of large quantities of the nitrate of soda in commerce must exercise a great influence on certain manufactures, and even give rise to new ones, I have deemed it expedient to examine several specimens of the nitrate with great care.

Analysis has demonstrated, that these specimens were similar in their composition, and may be considered as pure, with the exception of about  $\frac{1}{100}$  of hydrochlorate of soda. In fact, nitrate of barytes and oxalate of ammonia scarcely occasioned any change in their solutions, though sufficient to mark the existence of sulphuric acid and lime. A mean of three experiments afforded,

Nitrate of soda,	96.698
Hydrochlorate of soda,	1.302
Water,	2.000
Sulphate of soda, }	
Lime. }	a trace
	<hr/>
	100.000
	<hr/>

According to the notice, however, in the *Dictionnaire des*



*Sciences Naturelles*, it would appear that the nitrate of soda from Peru sometimes contains a notable admixture of sulphate. However this may be, the property which this salt possesses of being much more soluble in water than the hydrochlorate of soda, will permit this latter to be readily separated from it, either by repeated solutions and crystallizations, or by simply washing it with cold water. When thus freed from the hydrochlorate, the nitrate of soda may be employed with more advantage than the nitrate of potash, in the manufacture of nitric acid, from its containing a greater proportion of acid to the base: thus, 100 parts of nitrate of potash are formed of,

Potassa,	47
Anhydrous nitric acid,	53
	— 100

Whilst 100 parts of nitrate of soda contain,

Soda,	36.84
Anhydrous nitric acid,	63.16
	— 100

In substituting the latter for the former, the difference of capacity of saturation of the two bases must be borne in mind, and the proportion of sulphuric acid consequently varied; otherwise there would be a risk of not decomposing all the nitrate, or of obtaining only a weak acid.

It is perhaps from not having paid attention to the composition of the nitrate of soda, or to the small quantity of hydrochlorate contained in that from Peru, that some manufacturers have as yet succeeded in making but an acid of inferior quality from it.—*Journal de Pharmacie*.

ARTICLE XXXVII.—*On Mercurial Ointment.* By A. Baudrimont.

The length of time required to prepare mercurial ointment, and the fatigue attendant on the continued and automatic motion which its trituration demands, have induced a number of druggists to search out and describe means to attain the desired result with greater certainty and expedition. Some make use of very viscous substances, such as turpentine and honey, which really favour the extinction of the mercury; others have preferred rancid fat, which *sometimes* succeeds; but pharmaceutical rules being opposed to the introduction of foreign substances in officinal preparations, and the smell of rancid fat rendering it repulsive, and giving rise to new properties, many apothecaries adhere strictly to the legal formula. These latter must often be astonished to find that fresh axunge sometimes readily extinguishes the mercury, and at others appears to have no action on it. A multitude of experiments have been made to discover what difference existed between these two kinds of axunge. M. Simonin thinks that this difference is owing to an alteration, produced by *a matter which he could not isolate*, the presence of which is formed from the effect of humidity. M. Chevallier has indicated a plan which constantly succeeds when fresh axunge is employed. This consists in melting it, pouring it into a bottle with the mercury, agitating them rapidly, and afterwards pouring the mixture into a mortar, where the trituration is continued. The method of M. Hernandes, founded on the same principles, is equally successful. Moreover, we have found that melted axunge poured into a mortar and rapidly shaken until it has solidified, is well calculated to extinguish the mercury in a short time, provided the conditions indicated by M. Desmarest be strictly complied with, viz. that the operation be carried on at such a temperature that the fat shall neither be too fluid nor too solid; either of which would necessarily oppose the

proper division of the mercury; a too great fluidity, because it would not prevent the metallic globules from collecting in one mass; a too great solidity, because it would destroy the viscosity of the fat and prevent it from yielding under the pestle. We may also add, that the mercury, although seemingly extinguished, may suddenly appear in the form of globules, from a prompt chilling of the fat, as the latter contracts much on cooling, and permits the mercurial particles to approach each other and become united.

In reviewing what has been said, it is evident that it is not always advantageous to add foreign bodies to the fat or mercury in the preparation under consideration; that rancid fat will not extinguish the metal sooner than fresh; that it sometimes happens, that circumstances occur in which this extinction takes place with rapidity; that these constantly take place whenever the axunge is melted and rapidly cooled whilst it is constantly agitated. The circumstances indicated by M. Simonin not being brought together in this last case, it may be concluded that his explanation is not exclusive, and that having operated on small quantities of axunge, that it cooled rapidly, which allies his observations with our own. We may also add, that the explanation given by this author has been successfully combatted by M. Vivié, who has justly observed, that the vapour of water does not render fat more susceptible of extinguishing mercury.

To discover the theory of the preparation of mercurial ointment, it is necessary to seek what modification the fat may undergo by the fusion, agitation and rapid cooling. In analysing the phenomena, it is seen that a mere fusion and a slow cooling are not calculated to cause the fat to extinguish the mercury with rapidity. The agitation of this fat when solidified is not advantageous, and that fat melted and stirred till it solidified, being again melted and cooled slowly, again became incapable of extinguishing the mercury with rapidity. These facts are not conclusive enough to prove that the sudden alteration of the fat is not of a chemical character; but when

the mechanical explanation which follows is considered, it will be seen that it is sufficient to explain it and to cause a rejection of chemical phenomena. The fat being composed of oleine fluid at common temperatures, and of a great quantity of stearine, which is solid under the same circumstances, this latter not dissolving in the oleine except in certain limits, it results that by a slow cooling it crystallizes and is simply suspended in the oleine, as we see it in olive and rape oil; whilst, if the axunge is rapidly stirred, the crystals cannot form, and the matter which would constitute them remains in a state of extreme division in the oleine.

The crystallized axunge being several times slightly compressed between unsized paper, leaves upon this latter indeterminate but recognizable crystals. The triturated fat, on the contrary, affords only a homogenous mass. We have seen a mass of tallow of 150 kilogrammes entirely crystallized from having been melted, and requiring 48 hours to solidify. It was formed of crystalline spheroids, impregnated with oleine, which were easily separated from each other, as if the tallow had lost much of its consistence. Every one must also have observed axunge, the surface of which was mamillated, the irregularities being owing to crystalline groups.

After having considered the preceding facts, it is readily explainable why fat slowly cooled, being formed of oleine and of stearine in crystals, has not sufficient cohesion to divide the mercury, and that the thickness and solidity of the crystals are opposed to a minute division of the metal which escapes in the interstices of these crystals. The contrary takes place in melted fat, stirred and rapidly solidified.

It must also be observed, that the constituent parts of the axunge, not being chemically combined, are not in invariable proportions, and that the relation of the quantities of the oleine and stearine change not only in different individuals, but also in different classes of animals; the limits of the variation, however, are more restrained in the first case. I am indebted to M. Dupuy for the remark, that in axunge stearine is found



in relation to the oleine in greater quantity in the winter than in the summer, and that this remarkable difference appears to arise from the difference of nourishment of the hogs, as more food is given them during the first of these seasons than during the latter. This being granted, and even confining ourselves to the conditions we have mentioned, and in varying the temperature to obtain about the same degree of cohesion, we must not expect to obtain invariable results.

There is an experiment of M. Simonin which may appear as contradictory to our observations, namely, that where *the fat* in which the stearine was evidently crystallized in a mamillary form *possessed in a high degree the property of extinguishing mercury*. To make this experiment agree with the theory which we have proposed, it is necessary to remark that experiments made with small quantities of mercury and axunge ought not to be compared with such as are made in large masses; because the pestle coming in contact with a large surface of the axunge, rapidly breaks down the crystals, and induces such a state of it as is calculated to extinguish the mercury in a prompt manner, an effect which cannot take place when several pounds of the materials are operated upon. For this reason the extraction of the mercury is always much facilitated, by triturating the mixture with a muller on a plane surface, after having first triturated it in a mortar, or what is always better, having followed M. Chevallier's plan.—*Journ. de Pharm. March, 1832.*

ARTICLE XXXVIII.—*Red Colouring Principle obtained by the partial Dehydrogenation of Alcohol, Sugar, Starch, &c. By M. Rouchas, of Toulon.*

Whenever a mixture of alcohol and nitric acid is subjected to the action of heat sufficient to boil it, and the vessel containing it be then removed from the fire to permit reaction to take place, products are obtained which vary according to the respective proportions of fluids in the mixture.

If the acid and alcohol are in equal portions, the products are azote, protoxide of azote, deutoxide of azote, water, carbonic acid gas, nitrous acid gas, acetic acid, nitric ether, and a substance readily carbonised, a little nitric acid, acetic acid, alcohol and water, which remain in the retort.—(*Thenard.*)

If, on the contrary, the mixture consists of one part of alcohol and three parts of nitric acid, oxalic acid is also produced, as was first observed by Scheele and Hermstadt.

Having lately tried the effect of three parts of the nitric acid of commerce on one part of alcohol at  $38^{\circ}$ , according to the above described process, I observed not only the formation of the above mentioned products, but also that the alkalies, as potassa, soda, ammonia, and their carbonates, had the property of developing, in the fluid resulting from the reaction, a very beautiful red colour, a fact which I am inclined to believe is new, as no chemical author alludes to it.

I moreover found that this fluid acquired the property of becoming red on the addition of an alkaline substance, only when the reaction was entirely finished; that is, after the emission of a great quantity of rulant vapours of nitrous gas, and when the ebullition had entirely ceased. In trying the fluid by an alkali at different periods of the operation, it may be easily proved that the colour obtained is intense in proportion as the action of the nitric acid on the alcohol has been prolonged.\*

\* Sugar, starch, and some other vegetable products, gave the same results under similar circumstances.

I have also ascertained that I could give rise to this colour without having recourse to heat, and found that it was sufficient to pour very concentrated nitric acid ( $45^{\circ}$  to  $48^{\circ}$ ) on alcohol; each drop as it touched the alcohol caused a noise similar to that produced by plunging a red hot iron into water; and it is only when the quantity of acid is about one-tenth to one-eighth of the alcohol, that the mixture enters into ebullition of itself; then the remaining fluid, treated with an alkaline substance, assumes the red colour.

Is this red colour thus arising from the reaction of nitric acid on alcohol, sugar, starch, &c., and developed by an alkali, analogous to that which is formed at the same time as purpuric acid, when this latter is prepared by heating the uric and nitric acids together? We should be inclined to answer in the affirmative, on taking into consideration the experiments of M. Laissaigne, and those of the learned Vauquelin, whose loss we have to deplore. In fact, these chemists have shown that colourless purpuric acid may be obtained, and that the red colour presented by this acid when prepared by the usual method, is foreign to it, and appertains to a peculiar colouring matter.

This being admitted, it may be taken for granted that it is to the portion of ammonia formed at the expense of the elements of the nitric and uric acids, during their reaction and decomposition, that this phenomenon of the production of a red colour is owing, and that this alkali acts, as respects the impure purpuric acid, as the potash, soda, &c. do as regards the sugar or alcohol previously treated with nitric acid.

This reasoning, although plausible, is still hypothetical, since positive facts are wanting to substantiate it. Hence I repeated my first experiments, as well to satisfy myself of their correctness, as to isolate the colouring principle, and to ascertain its nature. Without specifying the methods and substances I employed, I will merely observe that the use of pure charcoal (a plan which perfectly succeeded with Vauquelin, in the separation of the colouring matter accompanying the purpuric acid), afforded me no satisfactory result; the mixture, it is

true, was rendered colourless by the charcoal, aided by heat; but I was unable to separate the colouring matter from this non-metallic combustible body, which led me to think that its constituent principles were easily disassociated. Not being able, therefore, to separate this red principle in a direct way, or to ascertain its chemical constitution, and still believing that, if not identical, it at least had much analogy with that which accompanies purpuric acid, I wished to satisfy myself whether the fluid mixture did not contain this organic acid, an acid whose presence alone in this case would, indirectly, it is true, have led me to suspect the nature of the colouring matter. For this purpose, after having added acetate of lead to the fluid, which formed a copious precipitate, I filtered it, and washed the residuum left on the filter with cold distilled water; I afterwards mixed it with water, and passed a current of sulphuretted hydrogen gas through the mixture; this was again filtered, and gently heated to drive off the excess of the gas, then treated with pure carbonate of lime as long as any effervescence took place; it was again filtered, but the liquid obtained, instead of containing only the purpurate of lime in solution, afforded a malate of the same base.

From these facts I was obliged to doubt the identity of the red colouring matter in question with that which accompanies purpuric acid, a doubt which was well founded, as subsequent experiments have enabled me to procure this colouring principle in several ways without resorting to any azoted body. Thus:

1. If an excess of chlorine gas be passed into a flask containing sugar and water, and the vessel be permitted to remain undisturbed for twenty-four hours, and this fluid, which has become very acid, be neutralised by potassa, the liquid immediately assumes a reddish yellow colour, which is changed to red on slightly heating the mixture. Bromine acts in the same way.

2. If, to a watery solution of perfectly pure gum arabic, there be added a few drops of a solution of nitrate of silver, the mixture



will gradually assume a beautiful red colour. This phenomenon will instantly take place if the vessel containing the fluid be exposed to the action of the solar rays. This liquid appears of a dirty green by reflected light, and of a rich red by transmitted light.

3. If the same experiment be repeated, substituting sugar and water for the solution of gum, the fluid does not become coloured, and lets fall a precipitate of a blackish colour, which was observed and studied some years since by M. Vogel, of Munich. But if the sugar and nitrate of silver be finely powdered and mixed together, this dry compound will soon become moist, and assume a red colour, which is intense according to the light in which it is viewed.

4. We also know that a mixture of arsenic acid and sugar also assumes a beautiful red colour, which in time becomes so deep as to appear black. Knowing this fact from hearsay only, and not having verified it, I am ignorant of the theory which has been assigned for this phenomenon, as well as the author of the discovery, but I think that the colouring matter thus obtained cannot differ from that produced by the above mentioned methods.

*Theory.* The chemical composition of the red colouring matter is entirely unknown to me, not having been able to isolate it; but every thing leads me to believe that it only differs from alcohol, sugar, starch, &c., by containing a less quantity of hydrogen. In fact, if the sugar and nitrate of silver when mixed together become moist, before assuming the red colour, must it not be admitted that there is a formation of water at the expense of the hydrogen of the sugar and of the oxygen of the oxide of silver, perhaps even of the oxygen of the nitric acid, for this acid is not of difficult decomposition.

On the other hand, the procedure to obtain this colouring principle by means of chlorine, a combustible body which has the greatest affinity for hydrogen, proves to me that the theory I admit is probable the true one.

As to the solution of gum to which a few drops of nitrate of silver were added, the same theory may be applied to it; for having kept a solution thus coloured for six months, I found that the fluid, without losing its transparency or intensity of colour, deposited some grains of a greyish powder, insoluble in ammonia and in diluted nitric acid, but soluble in nitric acid with a disengagement of nitrous vapours; this solution, on the addition of hydrochloric acid, let fall a white, curdled precipitate, soluble in ammonia; it was therefore metallic silver. This experiment is in opposition to the opinion promulgated by MM. Sementini, Payen and Chevallier on the nature of this precipitate, and supports, on the contrary, that of M. Casaseca.

As regards the action of arsenic acid on sugar, it is probable that the formation of the colouring matter is likewise owing to the partial dehydrogenation of the saccharine principle; in fact, the mixture, before becoming red, is very moist, which I attributed to the deliquescent property of the arsenic acid; but having placed a portion of this mixture under the receiver of an air-pump, and in a perfectly dry air, it still became moist, and afterwards red. What corroborates this view of the subject, is the black colour which this mixture assumes after a lapse of some days, a colour which doubtless is owing to carbon, which becomes more and more predominant.

Finally, during the reaction of nitric acid on alcohol, sugar, &c., it is probable that among other products which are formed, that a part of the vegetable matter, in becoming decomposed at the same time with the nitric acid, yields a portion of its hydrogen to the oxygen of the acid, and is thus transformed into colouring matter.

But a circumstance, in which this red principle is developed, and where I am unable to assign the cause, is the following: if powdered white sugar be put in a test-glass with some fragments of caustic potash, the red colour will be developed, without any visible disengagement of nitrous and rulant vapours. To explain, in this case, the dehydrogenation of the

sugar by the nitric oxygen, it must be admitted that the nitrous gas remains in solution in the liquid, or rather that a hyponitrite is formed.

I have also ascertained that if the fluid arising from reaction of nitric acid on alcohol be neutralised; for example, if a few drops of nitrate of silver be added, it is merely necessary to throw in an excess of caustic potash to cause a reduction of the metal. This fact appeared both interesting and new, but I have discovered M. Casaseca had ascertained that potassa, soda and ammonia, have the property of precipitating silver in a metallic form, from a vegetable solution, as gum water, infusion of coffee, &c. containing nitrate of silver: this chemist is of opinion that this effect is owing to the reaction of these bases on the vegetable matter, in consequence of which the metallic silver is thrown down, or rather, perhaps, this takes place from the saturation of the nitric acid preventing its acting on the silver. As M. Casaseca does not tell us what principle deoxidises the silver, I am led to conclude, from what has been stated, that this reduction is effected by the carbon of the vegetable matter. There is nothing surprising in this, for we know that if nitrate of silver be mixed with charcoal, and heated to  $212^{\circ}$  F., a disengagement of deutoxide of azote and carbonic acid occurs, and the silver assumes the metallic state. So, likewise, if a solution of silver, mixed with charcoal, be exposed to the action of the light, a decomposition takes place, with an extrication of carbonic acid and nitrous gas, and the metal is revived. The light is absorbed, there is an elevation of temperature at the spot on which the light impinges, and the same result is produced as if heat had been employed. In fine, I think I may conclude:

1. That nitric acid, in acting on alcohol, sugar, starch, &c. gives rise, among other products, to a peculiar and not azoted colouring matter.

2. That the alkali only acts in the development of the colour, by neutralising the excess of the nitric acid, and in thus disengaging the red matter; for an additional quantity of acid

has the property of destroying the red colour, which, perhaps, can be reproduced by adding a fresh dose of the alkali.

3. That this red principle is chemically composed of the same elements as sugar, alcohol, starch, &c. except that the hydrogen is in a less proportion.

4. That the red colour which is developed in mixing—1, sugar or gum water with the nitrate of silver; 2, arsenic acid with sugar; 3, chlorine or bromine with sugar and water, is identical with the red principle obtained by the action of nitric acid on alcohol, sugar, &c.

5. That nitrate of silver, nitric acid, arsenic acid, chlorine and bromine, act on the vegetable substances above spoken of; the three first by dehydrogenising them by means of the oxygen, and the two latter by appropriating the hydrogen, from their great affinity for this combustible body, and thus giving rise to a hydracid.—*Journal de Pharmacie.*

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ARTICLE XXXIX.—*On the determination of the quantity of Urea contained in Urine. By M. L. A. La Cuna.*

Being recently requested by M. Edwards to analyze the urine of a woman affected with dropsy, I adopted the mode of extraction employed by our colleague, M. Henry, Jun. This plan, described in the 15th vol. of the *Journal de Pharmacie*, consists, as may be recollected, in pouring into recent urine a slight excess of a solution of the subacetate of lead, filtering and concentrating the fluid, after having added small quantities of sulphuric acid, until crystals are formed. But either from an error in my operations, or from M. Henry's plan owing its success to circumstances as yet imperfectly appreciated, I was unable to obtain satisfactory results. Forced, therefore, to recur to the old plan, I thought I might take advan-



tage of the occasion to ascertain if it would not be possible, by means of some slight modification, to prevent at least a part of the inconveniences of this plan. In fact, it is well known that in the process of M. Vauquelin, otherwise extremely ingenious, and entirely satisfactory, when it is merely intended to procure urea, that the prolonged employment of heat, the decomposing action exercised by the carbonate of potassa on the urea, and the difficulty of completely separating the salts which accompany it, are so many causes of errors which do not permit an exact valuation of the proportion of urea in the urine, where only small quantities are operated upon.

Now, in reflecting on the singular property which urea possesses of forming a crystalline compound with nitric acid, sensibly insoluble in an excess of the acid, I thought that if this compound constituted, as there was every reason to believe, a true combination in definite proportions, the manipulations, to which were mainly attributed the want of certainty in the results, would become useless. In fact, that it would suffice to collect the nitrate, to dry it, and to determine by calculation the proportion of urea it contained.

To ascertain the composition, I poured into a solution containing 10 grammes of perfectly dry nitrate of urea, and deprived of all excess of acid by two successive crystallizations in distilled water, a solution of sub-carbonate of soda obtained by dissolving 50 grammes of dry sub-carbonate of soda in 400 grammes of distilled water. The fluids, at first acid, manifested a slight alkalinity when I used 42 grammes of the solution. In two other experiments, 10 grammes of the nitrate of a new operation required for their complete decomposition  $12\frac{1}{2}$  grammes of the alkaline solution.

Hence it follows that 10 grammes of nitrate of urea decomposed 4.68 of dry sub-carbonate of soda, representing 2.75 of real soda, and consequently that this nitrate constitutes a real compound of definite proportions, formed of

Nitric acid,	.	.	46.50
Urea,	.	.	53.50
			<hr/> 100.00

Consequently, when it is wished to determine the proportion of urea contained in a urine, instead of decomposing the nitrate dissolved in water by the subcarbonate of potash or soda, as has hitherto been done, then evaporating to dryness, and afterwards redissolving the product of the evaporation in alcohol at 40°, it will suffice to evaporate the urine rapidly, till it is reduced  $\frac{9}{10}$  of its weight; to filter, when cold, to separate the microcosmic salts; to pour into the product its own weight of the nitric acid of commerce; to stir the mixture, and to collect on a linen filter the crystals of nitrate of urea, to press them well, and finally to dry them. It is not necessary to wash the nitrate several times, as has been recommended, for by this manipulation a portion of the nitrate is dissolved, especially in the last washings (for the nitrate, deprived of its excess of acid, becomes very soluble), and, besides, it is easy to obtain a salt of a good colour, by mere compression.

The modification of the plan of M. Vauquelin which I propose, ought to permit us to obtain the *maximum* of urea contained in the urine. What at least is certain, is that the proportion obtained by a direct experiment, is a little less than that indicated by calculation. At the same time, I should observe, that even in operating as above recommended, I have never been able to discover in urine the proportion of urea spoken of by Berzelius. The quantity, estimated by that illustrious chemist at  $\frac{30}{1000}$  of the weight of the urine, has never appeared to me to exceed  $\frac{20}{1000}$  to  $\frac{22}{1000}$  even in individuals in the flower of their age and in full health; do such great differences in the results arise from my want of skill or the erroneous mode of analysis I employed? I am unable to decide, for the memoir of M. Berzelius, vol. 79, *Annales de Chimie*, does not indicate his plan of procedure.—*Journal de Pharmacie*, Nov. 1831.

ARTICLE XL.—*On the Maté or Paraguay Tea.* By M. J. J. Virey.

This plant, which is a species of holly (*Ilex paraguayensis*, A. St Hilaire), grows in different parts of South America, especially in Paraguay, and in the inland parts of Brazil. It is known under the name of *yerva maté*; it is more particularly brought from Parana and Uniguay, where it grows spontaneously in the forests or on the borders of water-courses. It is about the size of an orange tree, and has opposite, shining, oblong, serrated leaves; the flowers are in axillary umbels, and have four petals and as many stamens. They are succeeded by red berries containing seeds.

The leaves gathered for tea are taken from plants of two or three years of age, or when the trunk is about an inch in diameter. They should also be gathered at the proper season, and never in the winter. These leaves are elliptical, somewhat cuneiform, and from three to four inches long; they must be of a bright green and not withered; they are deprived of their petiole, which is hard and ligneous. When they are dried they become fragile, for they are seldom found entire, and it has been supposed that they are purposely broken by the natives, to prevent a discovery of the plant from which they derive it. In this state, however, they are better fitted to make a good infusion. Their smell is not that of the true tea, though somewhat approaching it. The following is the description published by A. St Hilaire, in the *Mem. du Museum d' Histoire Naturelle*, tom. 8, p. 351. *Ilex Paraguaiensis, glaberrima, foliis cuneato-lanceolatis, oblongis, obtusiusculis, remoté serratis, pedunculis axillaribus multi-partitis, stigmatibus 4-lobis, putaminibus venosis.*

It is also known that tea-like infusions are made from the leaves of several other foreign hollies, which are more or less exciting and intoxicating, as the *I. vomitoria* or *cassine* of Florida, the use of which causes nausea and a temporary delirium.

The leaves of the Maté are prepared for making the tea in the following manner. A long cylindrical furnace is constructed, termed a *barbaqua*, in which a bright fire is made with the dry branches from which the leaves had previously been separated. When this furnace is hot, the leaves are spread on metallic plates so as not to touch each other, and introduced into it. An attendant, called a *quayno*, if expert, will prepare twenty-five pounds a day. The dried leaves are then packed in cotton bags of a large size.

The Portuguese learned from the natives of Paraguay the use of this kind of tea, and soon became fond of it, as it causes a slight and agreeable intoxication. There is a very great consumption of it in South America; the Creoles and Mulattoes are even accused by the inhabitants of Paraguay of having exterminated the natives by the fatigues to which they subjected them to obtain this luxury.

The Maté is generally used in Paraguay, La Plata, Peru, the kingdom of Quito, and the surrounding countries, and the vessel in which it is made scarcely leaves the fire. Besides sugar, a small quantity of lemon juice is added to it when drank; the same leaves will serve for several infusions.

The people of South America attribute the most astonishing properties to this plant, which is called by the Spaniards *yervo de palos*, and by the natives, *caa-cuys*, or *caa-mini*, or *caa-guazu*. If it be used in moderation it causes excitement and wakefulness, but, if in excess, it produces drunkenness, and tremors resembling those induced by the abuse of spirituous liquors. Opium causes the opposite effects, and is employed to remedy any ill consequences of the Maté. It appears, moreover, that the *Ilex Paraguaiensis* is not the only species whose leaves are used for Maté, for Martius mentions that the *I. gongonha*, a native of Brazil, has the same properties.

In Mexico they employ the leaves of the *Psoralea glandulosa*, and in Colombia, those of *Alstonia theaeformis*, as substitutes for tea.—*Journ. de Pharmacie*, March, 1832.



ARTICLE XLI.—*On the Nature of the Acid which is developed in Rancid Fat, &c.* By M. Saladin.

Among the changes which take place in most substances containing a great proportion of hydrogen, and the new combinations produced by the action of time and the air, in the fatty bodies, is the formation of an acid, which has long been known to chemists, but whose nature and properties have not as yet been the subject of special investigation.

This acid is to be met with not only in rancid oils and fats, but also in the volatile oils, the turpentine and natural balsams, which have been kept for any great length of time. It does not exist in stone coal, bituminous schist, in asphaltum, petroleum or naphtha, which confirms the propriety of making use of this latter substance to preserve the alkaloid metals. The ammoniacal fatty bodies, old cheese, soaps, and plasters, do not present any traces of it, even after their distillation with a fixed acid. Being united with variable proportions of ammonia and water, in old fixed and volatile oils, &c., it is readily extracted by distillation, and one of its invariable properties may be recognised, that of instantly decomposing the hydriodates, setting free the iodine, and giving rise to a new salt, less soluble than the hydriodate operated on, in the form of brilliant, satin-like particles, of a micaceous chatoyant appearance. If more concentrated solutions be operated upon, a flocculent precipitate is formed, sometimes very abundantly, of a more or less deep yellow colour, soluble in a greater quantity of water, insoluble in alcohol at 0.79, and yielding part of its colour to rectified sulphuric ether.

The alteration produced by rancid fat on the hydriodate of potash is already known, and M. Gallard, who appears to have been the first to have remarked it, attributed it to the oxygenation of the potassium contained in the salt in the state of an iodide. The same phenomena occurring with hydriodic acid and the hydriodates, it becomes interesting to search for the

cause, and to determine the nature of the acid which appears to produce it.

Thinking that it might form part of the abundant precipitate which it causes in the solutions of the hydriodates, I tried to extract it, by distilling the precipitate with a great excess of tartaric acid in powder; the acid liquid obtained gave no traces of it. The residue in the retort, which was forgotten for a few moments, became more heated, and spontaneously inflamed with scintillation. The fluid above the precipitate, and the mixture primarily formed, were treated in the same way, but without success. The same product was then several times redistilled over a tolerably large quantity of very old lard, and at last assumed a marked acid character. When evaporated, it did not crystallise, remained without sharpness, and had no action on the skin; it did not disturb solutions of the salts of lime, barytes, or silver; with the subacetate of lead it caused the formation of a basic carbonate; with the washings of essence of turpentine, that of a succinate. When placed in contact with organic colouring matters, it slowly destroyed them, thus accounting for the white colour which is produced after some time in the corks of bottles containing the essential oils, as well as the action of these latter substances on potassium, copper, &c. They continue to act, however, on this latter body, even without being acid; in such case they owe this power to the presence of a variable quantity of ammonia in the state of an acetate, which always exists in rancid grease, &c. It is found in a proportion corresponding to the hygrometrical state of the body, and hence would appear to be owing to the slow decomposition of a small quantity of water, and the combination of its hydrogen with the ambient nitrogen.

This acid appearing to lose its properties in combining with salifiable bases, forming salts resembling the acetates, and seeming to me to be analogous to that known under the name oxi-acetic, I prepared some of this, which instantly decomposed the hydrosulphuric and hydriodic acids, but there was no formation of the micaceous precipitate, as with the water

distilled from rancid fat. If we attempt to oxygenize the acetic acid by means of the peroxide of barium, by acting, except with the sulphate of silver, as if to obtain the deutoxide of hydrogen, we can readily give it this quality; it even becomes more sensible, by successive precipitations, whilst at the same time it is impossible to modify the acetic acid in such a way as to give it greater density and consistence, or to render it capable of acting on the skin.

Calling to mind the action of the peroxide on the hydriodates, it became easy to foretell of what nature the precipitate would be. After having successively subjected it to the action of nitrate of silver and ammonia, to isolate the iodide, I obtained an iodate, which equalled  $\frac{3}{5}$ ths of the salt employed. Thus, there exists oxi-acetic acid of a variable density, both free and combined with ammonia, in old volatile oils, and in rancid fatty bodies, and it is to this they owe, among other properties, than of transforming, in part, the hydriodates into iodates and acetates, united with a greater or less proportion of ioduretted hydriodate. The alteration which the salts, as well as the cyanide of potassium, undergo when mixed with acid fats, should lead us to prefer a cerate as an excipient, the addition of an alkali preventing their decomposition but imperfectly. The oxi-acetic acid not occurring in petroleum and naphtha, it becomes possible to recognise their falsification by essence of turpentine. Thus, if we triturate some grains of the hydriodate of potash and water with a little of these adulterated bitumens, a yellow colour will make its appearance towards the bottom, even where there is only  $\frac{1}{30}$  of the turpentine, which soon becomes of an orange red if there be more.—*Journ. de Chim. Med.*

## MINUTES OF THE COLLEGE.

June 26th, 1832. The Board of Trustees reported the election of John F. Stahl, of Cincinnati, as an associate member.

On recommendation of the Board of Trustees, William Scattergood was duly elected a resident member.

The Board of Trustees also reported that, having received notice from the Professors and Examining Committee that Richard M. Reeve and John Bringham, candidates for the diploma of the College, had passed a satisfactory examination, and complied with all the requisitions of the institution, the Board conferred the degree of Graduate of Pharmacy upon each of the above named candidates.

A letter of resignation from Caspar W. Morris was read and accepted.

September 25th, 1832. The Board of Trustees reported the election of George S. Clemens as a resident member, and of Bernard Mesthé as an associate member.

Dr J. K. Mitchell was duly elected an honorary member.

The Corresponding Secretary submitted letters of acknowledgement from the following honorary members.

J. T. Ducatel, M.D.	Baltimore.
J. P. Emmet, M.D.	Charlottesville.
M. Faraday,	} London.
John T. Barry,	
T. I. Clemens,	Paris.



The semi-annual election of Trustees was then held, when Peter Lehman, A. S. Roberts, Dr G. B. Wood, Joseph Scattergood, William Hodgson, Jun., S. P. Griffiths, Jun., F. H. Smith and S. F. Troth, were duly elected.

## MISCELLANY.

*Madder.*—MM. Gaultier de Claubray and Persoz do not think that the colouring matters obtained either by M. Kuhlmann or by MM. Robiquet and Colin are the true colouring principles of madder. They give the following mode of obtaining the colouring matters of this root, the one red, the other rose colour. Madder, in powder, is to be mixed with a sufficient quantity of water to form a very thin mass; 90 grammes of sulphuric acid are to be added for each kilogramme of the madder. It is to be boiled either over a naked fire, or by means of steam; the transformation of the gum into sugar takes place, after which the madder is readily exhausted of its colouring matters. After this, oxide of tin mixed with a little potash is to be added, when a liquor of a deep red colour will be obtained, which contains the two colouring principles. This liquid is to be neutralised by means of an acid which precipitates the two colouring matters; this precipitate is to be carefully washed, and subjected to the action of alum water, which will take up the rose coloured principle. The residue is to be dissolved in alcohol, and distilled; the substance obtained on evaporation is the red colouring principle; by a spontaneous evaporation it can be obtained in a crystalline form.

On pouring in the aluminous liquid a slight excess of concentrated sulphuric or hydrochloric acid, a beautiful orange red precipitate is formed, which is to be carefully washed; this is to be dissolved in alcohol and evaporated; it is the rose-coloured principle. The red colouring matter is of a brown red, scarcely soluble in cold water, but more so in hot, which does not deposit on cooling. It is not altered by the weak acids; is readily soluble in the alkalies. The acids precipitate it without alteration. It is soluble in alcohol, and still more so in ether; by spontaneous evaporation, it separates in the form of crystalline needles. Alum-water does not dissolve it. Heat decomposes it, giving traces of alizarine. It gives alumed cloths a brick red colour, without brilliancy, but very permanent; it is soluble in the protochloride of tin, the hydrosulphate of ammonia, and the protoxide of tin mixed with potassa.

The rose-coloured principle, when in powder, is of a superb rose colour; weak sulphuric acid has no action on it. The alkalies dissolve it without the assistance of heat. The solution is of a violet colour, which is changed to a yellowish red on the addition of an acid. Left to itself, the alkaline liquor forms a deposit on cooling, as the rose-coloured principle is not soluble in the carbonates when cold. The aluminous salts give a solution of a beautiful cherry red. The rose-coloured prin-

ciple is scarcely soluble in water. Alcohol and ether dissolve it, and permit it to crystallize on spontaneous evaporation. Chlorine destroys it more readily than it does the red principle. Heat decomposes it and gives rise to a little alizarine. The protochloride of tin and the hydrosulphate of ammonia dissolve it. The protoxide of tin, with the addition of a few drops of potassa, dissolves it in all proportions, forming a liquid of an extremely brilliant red colour, which dyes cloths of a beautiful rose tint. It is soluble in concentrated sulphuric acid, which does not alter it.—*Journ. de Pharm. Feb. 1832.*

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<i>Lotion for burns.</i> —R. Benzoin,	dr. vi.
Storax,	dr. iv.
Bals. toltan,	dr. ij.
Aloes,	dr. i.
Alcohol,	oz viij.

F. S. A. a tincture which is to be employed frequently as a lotion, immediately after a burn has taken place and before a vesicle has formed.—*Journ. de Pharm.*

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*Colica Pictonum.*—Dr. Gendrin, of Paris, has had astonishing success in the cure of this disease by the use of alum and sulphuric acid; he gives them in the following manner:

R. Acid Sulphate of alumine and potassa,	oz. ij.
Distilled water,	oz. iv.
Syrup simp.	oz. ij.

To be taken in three or four doses.

Or—R. Sulphate of alumine and potassa,	dr. ij.
Distilled water,	oz. iij.
Sulphuric acid,	gtts. x.
Essence of lemon,	gtts. vi.
Syrup of lemons,	oz. ij.

A spoonful to be taken every hour: the patient not to eat for some time before and after taking it.

Dr Gendrin also advises the use of sulphuric acid as a preservative against the attacks of the colic, in the following form:

R. Sulphuric acid,	dr. i.
Water,	lb. iij.

A glassful to be taken daily, sweetened with an ounce of syrup of gum.—*Journ. de Pharm.*

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*Maraschino.*—It is well known that the cordial called Maraschino of Zara is formed with an alcohol obtained like the *kirschenwasser* from the fermented fruit of a species of cherry in Dalmatia. The word Maraschino appears to be a corrupted abbreviation of *amare cerasus*. To this alcohol agreeable aromatics are added, forming an esteemed cordial. M. Host, a distinguished botanist at Vienna, has described the species of cherry, which under the *Cerasus marasca* is more particularly cultivated for the purpose of making the above mentioned cordial. It is of low growth, and has black fruit.—*Journ. de Pharm.*

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*Specific gravity of seeds.*—MM. Schubler and Renz, of Tubingen, have made

some interesting researches on the specific gravity of seeds, and of the immediate principles of vegetables. They have discovered a remarkable law of nature: that every vegetable produces a seed essentially of the same weight, with slight variations, when in its natural or normal state. There are certain specific and fixed limits, as in the size of many animals, especially insects; varieties in climate or nourishment may cause an increase or diminution of size, but the proportions remain the same. It appears, therefore, that animal and vegetable forms are subject to certain laws, like mineral or crystalline bodies. Of all seeds, those which are specifically the lightest are the oily, and which generally swim on the water; the heaviest are those filled with fecula, they are even heavier than the ligneous. Every genus, every species, is constant in the weight of its seeds (in an uncultivated or natural state.) The lightest seeds are those of the *umbelliferæ* and *compositæ*. The seeds of resinous trees are lighter than water. It was not, therefore, without a just foundation that the first weights established by the ancients were based on certain seeds (barley in the East, rice in India, and maize among the Peruvians). The heaviest flour is that of the potato, and the lightest that of the palm.—*Journ. de Pharm.*

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*Separation of some metallic oxides in chemical analysis.*—To separate oxide of iron from that of manganese, Mr Liebig boils the saline solution of these two oxides either with carbonate of lime or carbonate of magnesia. The precipitation is so complete that no traces of iron can be found in the fluid, and the precipitate does not contain the slightest trace of the oxide of manganese. This method, which also is successful in separating the oxide from the oxidule of iron, has nevertheless one objection: that the solution of the protoxide of iron becomes very turbid even when filtered, but this only takes place when the analysis has been made with carbonate of lime. Magnesia leaves a limpid fluid which does not become turbid, doubtless, because the magnesia forms a double salt with the protoxide of iron, which is less decomposable. The carbonate of lime, on the contrary, is the only reagent which should be used to precipitate oxide of iron from its mixture with the oxides of nickel and cobalt. Magnesia would precipitate all the oxides, and the same would take place with the carbonate of barytes. The carbonates of lime, barytes and magnesia, boiled with salts of lead or bismuth, completely precipitate their oxides. In cold solution, carbonate of lime precipitates bismuth only, whilst the lead remains in solution.—*Ibid.*

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*Chromium.*—To obtain this metal, Mr Liebig heats to redness in a glass tube a triple combination of the chloride of chromium with ammonia, and passes a current of ammoniacal gas through it. Metallic chrome is obtained in a pulverulent state, of a black colour, becoming bright under the burnisher, and burning at a red heat. Chromium may be obtained by a still simpler process, by reducing the chloride of chromium by ammoniacal gas; this gives a chocolate brown powder. The chrome thus prepared is altered at a red heat, but does not afford a green oxide. *Ibid.*

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*Modification of tartaric acid.*—Mr H. Braconnot has observed a remarkable property in tartaric acid. This acid, when heated violently for a few moments, swells up and leaves a dry, transparent substance, which can be drawn out into very



fine threads whilst hot. After this operation, the acid has lost 0.087 of its weight, is uncrystallizable and very deliquescent. Carbonate of lime, when added to its warm solution, does not form a precipitate of crystallized carbonate of lime, but the fluid gradually becomes turbid on cooling, and deposits a pitchy, mucilaginous, transparent insipid mass, which is ductile between the fingers like turpentine. This calcareous salt, when dried, resembles gum arabic. Hot water restores it to its former appearance. An excess of acid redissolves it, and the solution evaporated to dryness, leaves a fragile, acid salt as transparent as a varnish, which, after being sometime in contact with cold water, again affords a sandy precipitate of common tartrate of lime. The modified tartaric acid forms uncrystallizable salts with magnesia, soda and potassa; and excess of acid precipitates the solution of potassa in an insoluble form, which has nothing of the common granulated form of potassa.—*Journ. de Pharm.*

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*Morphine.*—M. A. Galvini has given a new method of obtaining this salt free from narcotine. His plan is a modification of that of M. Guillermond of Lyons. It consists of reducing an alcoholic solution of opium to the consistence of an extract by evaporation; then, by successive solutions and filtrations, separating all the resinous matter of the extract, so as to isolate the narcotine from the morphine; a somewhat prolonged boiling with calcined magnesia, and subsequent filtrations, washings and dryings, will afford very pure morphine completely free from narcotine. As to the resinous matter, by dissolving it in diluted sulphuric acid, then decomposing the solution by potassa, the narcotine is precipitated, and can be purified by a fresh solution in sulphuric acid, by means of ammonia, and after having been filtered, washed and redissolved in alcohol at 24°, it can be crystallized. In operating on a pound of opium, M. Galvini obtained eight drachms of perfectly white and well crystallized morphine.—*Bib. Universelle.*

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*Formation of carbonate of lime under the influence of sugar.*—Daniel concluded from his experiments, that when an aqueous solution of lime in sugar is left undisturbed, that the latter is destroyed and converted into a mucilaginous substance, whilst the lime precipitates in the state of a carbonate in the form of very acute rhomboids. M. Becquerel has obtained the same kind of crystals by means of weak electric currents, and as he operated in vacuo, the decomposition of the sugar is rendered certain. M. Pelouze concludes from additional experiments which he has made on this subject, that when the operation is carried on in the air, that the sugar undergoes no alteration, and that the crystals which are produced result from the action of the atmospheric carbonic acid on the lime. The action of the sugar is limited to presenting the lime to the carbonic acid, and the carbonate forms slowly in the midst of an aqueous fluid. It contains five atoms of water of crystallization; at 95° to 100° it gives it out and becomes pasty, but what is very remarkable, is, that the salt, which becomes completely free from water of crystallization at 100° whilst in the fluid, only loses two atoms when it is boiled in strong alcohol. The new salt of three atoms of water is efflorescent, whilst that with five is not altered.—*Journ. de Pharm.*

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*Mercurial ointment.*—M. Calloud, of Nancy, states that by the following plan he has never failed in obtaining an excellent mercurial ointment very rapidly. Melt

together one pound of very pure mutton suet and two pounds of axunge and leave the mixture to cool for twenty-four hours. A third of this mass is then to be taken and triturated in a mortar for a quarter of an hour, adding the mercury very gradually; when the proportion of mercury has been added, mix another third of the fat, again triturate for a quarter of an hour, then add the rest of the fat, and continue the trituration.—*Journ. de Pharm.*

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*New principle in opium.*—M. Bebert, of Chamberry, states that he has obtained another bitter principle from opium, which is crystallizable, forms salts with the acids, especially with the acetic; this crystallises in very white scales, its sulphate forms very white silky crystals. About four months since, he goes on to say, wishing to ascertain if the residue obtained in dissolving the opium of commerce in water to obtain the extract containing morphine and narcotine, and after having exhausted the residue by several affusions of water, he heated it several times with ammonia at 5° until that fluid was scarcely coloured; he then perceived at the bottom of the vessel small crystals, which were very white and brilliant. Having collected them on a filter and afterwards treated them with boiling alcohol, he obtained a fine group of crystals which he thought were morphine or narcotine, but further experiments proved that they were composed of narcotine and a principle not soluble in ether. He again treated them with boiling alcohol, and on the solution cooling, obtained acicular crystals which had none of the chemical characters of morphine. He obtained this substance, 1st, from the residue of the extract of opium dissolved in water: 4 drachms gave him 16 grains of narcotine and 8 grains of the new principle; 2d, from the residue of 4 ounces of opium of commerce, exhausted by water, he obtained 14 grains of the new principle and 8 grains of narcotine; 3d, from 4 drachms of the dry residue of the opium of Rousseau he got 6 grains of the new principle, and 10 of narcotine.—*Ibid.*

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*First discovery of Hesperidine.*—Gaubius, in his *Adversaria Varii Argumenti*, Leyden, 1771, states that he observed in some volatile oil of orange flowers, of about twelve years old, a crystalline substance, in small, aromatic, tender scales, having no acidity, soluble in water and spirits of wine, fusible at a low temperature, volatile without being inflammable.—*Ibid.*

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*Cajeput oil.*—At a meeting of the Society of Pharmacy of Paris (14 Dec. 1831) M. Planche stated that the specific gravity was not, as had been asserted, a certain criterion of its purity; as mixtures of oil of turpentine with some of the other volatile oils could be made of an identical gravity.—*Ibid.*

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*Hydriodate of phosphuretted hydrogen.*—Mr Serullas laid before the Society of Pharmacy of Paris (April 1832) specimens of this substance in large and beautiful crystals. He stated that it was easily procured by distilling a mixture of 15 parts of phosphorus and 60 of iodine triturated with pounded glass and moistened with 8 or 9 parts of water. The crystals obtained after the condensation of the gaseous products were exposed to a gentle heat in a vessel of proper size, and sublimed. This substance crystallizes in diaphanous cubes, is decomposed by water, forming hydriodic acid and proto-phosphuretted hydrogen. It volatilizes and may be passed through a heated tube without being decomposed; its vapour, however, is readily

inflamed by contact with an ignited body. Concentrated alcohol, with the aid of heat, transforms it into hydriodic ether and phosphuretted hydrogen gas. When heated with the nitrate of silver, it is transformed into iodine and phosphate of silver. With the cyanides of mercury or potassium, or the chlorides of mercury, there is a formation of ioides, hydrocyanic or hydrochloric acids, and proto-phosphuretted gas; finally, with sulphuric acid it forms several compounds, first, sulphurous and sulphuretted hydrogen gasses, then a precipitate of iodine, sulphur and phosphorus, which partly remain in solution, and of hydriodic acid which the excess of the sulphuric acid successively decomposes.—*Journ. de Pharm.*

*Iodic acid.*—The same chemist also exhibited a bottle containing crystallized iodic acid, which he obtained with facility by heating iodine with nitric acid, charged with deutoxide of azote. He stated that he first tried the plan of M. Misterlich, by nitric acid alone, and after a very long operation, obtained only a small portion of iodic acid.—*Ibid.*

*Soluble mercury of Hahnemann.*—M. Mornheim is of opinion that the following process will always afford a similar product, of a deep black colour. On 3 ounces of mercury pour 4 ounces of nitric acid of  $1.28^{\circ}$ , diluted with 6 ounces of distilled water; heat and gradually raise the temperature until about two-thirds of the mercury is dissolved. The solution is then to be diluted with a pint of distilled water, filter rapidly whilst hot, so as to prevent the deposition of crystals, and add to the filtered fluid 4 pints of distilled water. An ounce and a half of ammonia of  $0.95$  diluted with 8 ounces of distilled water is then to be added as quickly as possible, constantly stirring the mixture, and then the supernatant fluid quickly decanted from the precipitate, which is to be well washed and dried in a dark place. If the ammonia be not rapidly added it reacts on the precipitate, forming an ammoniacal deuto-nitrate of mercury. There is a reduction of a part of the mercury, and the colour becomes greyish. For the same reason, the precipitate must not be left for any time in contact with the liquid.—*Geiger's Journ.*

*New substance obtained from opium.* By J. P. Couerbe.—In 1830, having charge of the chemical operations at the laboratory of M. Pelletier, I obtained, in treating opium to procure morphine, a substance which appeared to me to be new; I apprised M. Robiquet of it, in a letter, which I had the honour of addressing to him; since that time this substance escaped me, until aiding M. Pelletier in an analysis of opium, I again found my substance, which I am now always able to procure. When pure, it is perfectly white and in needle-form crystals. It is soluble in boiling water, ether and alcohol, and crystallizes equally well in either of those fluids. It is easily fused, the temperature of boiling water being sufficient to melt it; hence the first effect of this liquid is to transform it into a kind of oil, which soon dissolves when the water is in a sufficient quantity. When heated in a small bent tube, it melts, and when this operation is carefully performed, becomes perfectly transparent; a temperature rather more elevated than that at which it fuses gives it a yellow tint, distills the greater part of it over, leaving a slight carbonaceous residue. Distillation does not appear to change the nature of this substance, for the above mentioned solvents restore it to its crystalline state. Finally, this substance, to which I give the name of *meconine*, when burnt with the oxide of copper in a proper apparatus,



gives out only pure carbonic acid; this is an essential character which distinguishes it from the substance discovered by M. Pelletier, from narcotine and from morphine. It also possesses a marked acidity which leads me to think that it will exercise some action on the human system.\*

[On the reading of this before the Society of Pharmacy, we find from the published abstract of their minutes, that M. Pelletier announced that he had obtained another crystalline substance from opium, differing from any hitherto found, and especially from the meconine of M. Couerbe. This substance is white, inodorous, and crystallizes in an acicular form. It contains azote. It is soluble in water and alcohol, especially when aided by heat, and on cooling again assumes a crystalline state. It is insoluble in ether. When added to a mineral acid diluted with a sufficient quantity of water, so as not to act in a direct manner on its elements, it assumes a blue colour. The proportions are equal quantities of hydrochloric acid and water, 2 parts water to 1 of nitric acid and 4 parts water to 1 of sulphuric acid. This substance does not strike a blue with the salts of iron, nor a red with nitric acid. M Pelletier proposed to give this substance the name of *narceine*.—Ed.]

*On the preparation of the iodides of barium and strontium.* By M. Henry, Jun.—Since chemistry has recognized the existence of iodine in a number of substances and mineral waters, whose success in certain affections were fully ascertained, the greater part of these good effects have been reasonably attributed to this singular body; and medicine has since made a happy use of this article, both alone and in a state of combination. Among those most generally employed, are the iodides of potassium and of mercury. Other iodides have also been proposed in certain cases, and I have more than once had occasion at the central pharmacy to prepare those of calcium, barium and strontium, iron, &c. at the request of some physicians of the hospitals. The three first, as is known, may be made either by saturating the oxides or carbonates of these alkaline metals by means of pure hydriodic acid, or as has been indicated by the 13th vol. of this journal, by the action of these hydrated carbonates on a solution of iodide of iron; after a proper evaporation the iodides are obtained, but these methods require complicated anterior preparations, and the want of solubility of the above mentioned carbonates, renders it difficult to attain the point of exact saturation without great trouble. Having had to prepare a certain quantity of iodide of barium, and wishing to avoid these inconveniences, I pursued the following plan, which is not unlike that of M. Fau, for the preparation of iodide of potassium.

It consists in decomposing, with care, a solution of the hydrosulphate of barytes by the tincture of iodine; for this purpose, after having treated by hydrochloric acid, and washing a quantity of sulphate of barytes, reduced to a fine powder, this salt is to be mixed with about one-sixth of some very decomposable organic substance, as starch, sugar, oil, &c.; the mixture is to be well calcined, and pure boiling water added to the residue, then rapidly filtered or decanted, with as

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\* The reading of this account recalled to my mind that M. Dublanc, Jun. presented, about four years since, a memoir to the Academy of Medicine, the object of which was to describe a new substance found in opium. This memoir having been consulted, M. Couerbe acknowledged that his meconine was identical with the substance discovered by M. Dublanc.—*Robiquet*.—*Journ. de Pharm.* Feb. 1832.



little exposure to the air as possible. To the solution is then to be added a very strong alcoholic solution of iodine, until a milk white precipitate is no longer formed; it is then to be filtered and evaporated, as is about to be described.

At each affusion of the iodic tincture, a white precipitate is to be remarked, which disappears when the hydrosulphate of barytes predominates, which then produces a greenish tint; the precipitated sulphur is no doubt redissolved in the salt, and induces another degree of sulphuration. The hepatic odour is, moreover, very disagreeable, above all mingled with that of alcohol.

When the proper point is reached, the filtered liquid being limpid and colourless, it must be evaporated by distillation (if large quantities be acted on), not to lose the alcohol, which may serve for similar operations. It is to be concentrated almost to dryness, diluted with a little water, and rapidly filtered through unsized paper, then very rapidly evaporated to dryness in a matrass or phial, so as to permit but a very small portion of air to come in contact with it as long as it is in a state of ebullition; the vessel is to be broken, and the iodide will be obtained in a grayish white mass formed of silky needles. This salt is very deliquescent, very soluble in alcohol, is precipitated by the sulphates; when heated in contact with atmospheric air it gives out iodine, when in contact with sized paper it decomposes in part, and turns the starch of the size blue. By pushing the evaporation to a degree less, the liquid crystallizes on cooling in very distinct acicular prisms, that may be collected after having drained off all the fluid from them.

The iodide of strontium was obtained in the same way; its colour was more yellow. When dissolved in alcohol it communicated to the flame of that body the usual purple colour characterizing the salts of this base.

N. B. It might perhaps be possible to prepare the bromide of barium by a similar procedure, in making use of a newly made tincture of brome.

The iodide of barium obtained by the above mentioned process was analyzed. one gramme well dried in a tube afforded results agreeing with its theoretical composition.

Barium,  
Iodine,

35.17  
64.83

— 100.00

*Journ. de Pharm. March, 1832.*

# JOURNAL

OF THE

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## Original Communications.

ARTICLE XLII.—*On the Medicinal Leeches.* By D. B. Smith.

The great and increasing use of leeches in the healing art, has given an importance to this aquatic worm, which is possessed by few animals so low in the scale of being.

The annual consumption of Paris alone is estimated at more than three millions of leeches, and the neighbouring departments being exhausted of their supply, the north and the south of France, Italy, Spain, Corsica, and Germany, even to the frontiers of Turkey, are explored by the dealers in leeches.

The species most commonly used in Europe is the gray and green leech, which are mere varieties of the *Hirudo medicinalis* of Linnæus. They have been separated into two species by modern naturalists, and Savigny has divided the genus *Hirudo* of Linnæus into several genera, and classed the medicinal leeches together under the name of *Sanguisuga*.

The officinal European leech varies much in its markings

and size. The belly is of a greenish olive irregularly marked with black, or having two broad irregular marginal longitudinal black stripes. The back is of a darker green or gray colour, and marked with six longitudinal bands, more or less continuous, of which the four outer ones are black, and the two inner, or central ones, of a light olive colour: sometimes there are but four of these bands, which are occasionally replaced by rows of black spots.

The first and second figures of the plate are drawn from an individual of this variety of the green leech.

The leech may be considered as an elastic extensible tube composed of a series of muscular rings. The stomach extends throughout its whole length, and the very curious jaws of the leech are situated at its anterior end. These jaws are three lens-shaped bodies (A, fig. 3) placed in the folds of the mouth. A sphincter muscle (B) beneath them draws the lower ends of these jaws together by its contraction, so as to make the triangular incision peculiar to the bite of the leech. These jaws are armed along their edge with sharp teeth, of which there are sixty or seventy in each jaw.

Our fourth and fifth figure represent the medicinal leech of America, the *Hirudo decora* of Say, which is here figured for the first time.

With the permission of the authors, we transcribe from the Dispensatory of the United States, the article *Leech* of that valuable and important work.

“HIRUDO MEDICINALIS. *Dub. The Leech.* Sangsue, *Fr.*; Blutegel, *Germ.*; Mignatta, *Ital.*; Sanguijuela, *Span.*

“HIRUDO. *Class 1, Annelides. Order 3, Abranchiata.* Family 2, Asetigera. *Cuvier.*

“The leech belongs to that class of invertebrated articulated animals called ANNELIDES. This class contains the worms with red blood, having soft retractile bodies composed of numerous segments or rings, breathing generally by means of branchiæ, with a nervous system consisting in a double knotted cord, destitute of feet, and supplying their place by the con-

tractile power of their segments or rings. The third order of this class—*ABRANCHIATÆ*, comprehends those worms which have no apparent external organ of respiration. This order is again divided into two families, to the second of which—the *ASETIGERÆ*, or those not having setæ to enable them to crawl—the leech belongs.

“It is an aquatic worm with a flattened body, tapering towards each end, and terminating in circular flattened discs, the hinder one being the larger of the two. It swims with a vertical undulating motion, and moves when out of the water by means of these discs or suckers, fastening itself first by one and then by the other, and alternately stretching out and contracting its body. The mouth is placed in the centre of the anterior disc, and is furnished with three cartilaginous lens-shaped jaws at the entrance of the alimentary canal. These jaws are lined at their edges with fine sharp teeth, and meet so as to make a triangular incision in the flesh. The head is furnished with small raised points, supposed by some to be eyes. Respiration is carried on through small apertures ranged along the inferior surface. Its nervous system consists of a cord extending the whole length, furnished with numerous ganglions. The intestinal canal is straight and terminates in the anus, near the posterior disc. Although hermaphrodite, leeches mutually impregnate each other. They are oviparous, and the eggs, varying from six to fifteen, are contained in a sort of spongy, slimy cocoon, from half an inch to an inch in diameter. These are deposited near the edge of the water, and hatched by the heat of the sun. The leech is torpid during the winter, and casts off from time to time a thick slimy coating from its skin. It can live a considerable time in sphagnous moss, or in moistened earth, and is frequently transported in this manner to great distances by the dealers.

“Savigny has divided the genus *Hirudo* of Linnæus into several genera. The true leech is the *Sanguisuga* of this author, and is characterised by its three lenticular jaws, each armed with two rows of teeth, and by having ten ocular points.



"Several species are used for medicinal purposes, of which the most common are the gray and the green leech of Europe, both of which are varieties of the *Hirudo medicinalis* of Linnæus ; and the *Hirudo decora* of this country.

"1. *Hirudo medicinalis*, Linn. ed. Gmel. I, 3095. *Sanguisuga officinalis*, Savigny. Moq. Tandon, Mon. Hir. p. 112, t. 5, f. 1. *The green leech*.—*Sanguisuga medicinalis*, Savigny. Moq. Tandon. Mon. Hir. p. 114, t. 5, f. 2. *The gray leech*.

"Many of the best zoologists regard the *S. officinalis* and *S. medicinalis* of Savigny as mere varieties. They are both marked with six longitudinal dorsal ferruginous stripes, the four lateral ones being interrupted or tessellated with black spots. The colour of the back varies from a blackish to a grayish-green. The belly in the first variety is of a yellowish-green colour, free from spots, and bordered with longitudinal black stripes. In the second it is of a green colour, bordered and maculated with black. This leech varies from two to three or four inches in length. It inhabits marshes and running streams, and is found abundantly throughout Europe.

"The great use made of leeches in the modern practice of medicine, has occasioned them to become a considerable article of commerce. They are collected in Spain, France, Italy, and Germany, and exported in large numbers to London and Paris. They are also frequently brought to this country, as the practitioners in some of our large cities use only the foreign leech, although our own waters furnish an inexhaustible supply of this useful worm.

"2. *Hirudo decora*. (Say—*Major Long's Second Expedition*, ii. 268.)—The medicinal leech of America has been described by Say under the name of *Hirudo decora*, in the appendix to the second expedition of Major Long. Its back is of a deep pistachio green colour, with three longitudinal rows of square spots. These spots are placed on every fifth ring, and are twenty-two in number. The lateral rows of spots are black, and the middle range of a light brownish orange colour.

The belly is of the same colour, variously and irregularly spotted with black.

“The American leech sometimes attains the length of four or five inches, although its usual length is from two to three. It does not make so large and deep an incision as the European leech, and is generally supposed to draw less blood. The quantity which a single full-grown native leech will draw varies from two to three drachms, but those of the largest size, we have been assured, will extract as much blood as the best foreign leech.

“The use of the indigenous leech is nearly restricted to the city of Philadelphia. The practitioners of New York and Boston depend for their supplies upon foreign countries, and leeching is seldom resorted to in the southern or western states. Those which are used in Philadelphia are generally brought from Bucks and Berks county in Pennsylvania, and occasionally from other parts of the state. It is estimated that from 200 to 250,000 are annually consumed.

“The proper preservation of leeches is an object of importance to the practitioner, as they are liable to great and sudden mortality. They are usually kept in jars in clear water, which should be changed twice or three times a week. The jar must be covered with a linen cloth, and placed in a situation not liable to sudden changes of temperature. They will live a long time, and continue active and healthy, without any other attention than that of frequently changing the water in which they are kept. M. Derheims has proposed the following excellent method of preserving them. In the bottom of a large basin or trough of marble he places a bed six or seven inches deep, of a mixture of moss, turf, and fragments of wood. He strews pebbles above, so as to retain them in their place without compressing them too much, or preventing the water from freely penetrating them. At one end of the trough, and about mid-way of its height, is placed a thin slab of marble or earthenware, pierced with numerous holes and covered with a bed of moss, which is compressed by a thick layer of pebbles.

The reservoir being thus disposed is half filled with water, so that the moss and pebbles on the shelf shall be kept constantly moist. The basin is protected from the light by a linen cover stretched over it. By this arrangement the natural habits of the leech are not counteracted. One of these habits, essential to its health, is that of drawing itself through the moss and roots to clear its body from the slimy coat which forms on its skin, and is a principal cause of its disease and death.

“*Medical Uses.*—Leeches afford the least painful, and in many instances the most effectual means for the local abstraction of blood. They are often applicable to parts which, either from their situation, or their great tenderness when inflamed, do not admit of the use of cups ; and in the cases of infants, are, under all circumstances, preferable to this instrument. They are indeed a powerful therapeutic agent, and give to the physician, in many instances, a control over disease which he could obtain in no other way. Their use is in great measure restricted to the treatment of local inflammations ; and, as a general rule, they should not be resorted to until the force of the circulation has been diminished by bleeding from the arm, or in the natural progress of the complaint.

“In applying leeches to the skin, care should be taken to shave of the hair, if there be any, and to have the part well cleansed with soap and water, and afterwards with pure water. If the leech does not bite readily, the skin should be moistened with a little blood, or milk and water. Sometimes the leech is put into a large quill open at both ends, and applied with the head to the skin until it fastens itself, when the quill is withdrawn. Leeches continue to draw blood until they are gorged, when they drop off. The quantity of blood which they abstract varies according to the part to which they are applied, and the degree of inflammation existing in it. In the loose and vascular textures they will abstract more than in those which are firm and compact, and more from an inflamed than a healthy part. As a general rule, our leechers apply six for every fluid ounce of blood. A single European leech will draw from half

an ounce to an ounce. The quantity may often be much increased by bathing the bite with warm water. Leeches will continue to suck after their tails are cut off, which is sometimes done, although it is a barbarous practice. They may be separated from the skin at any time by sprinkling a little salt upon them. After they drop off, the same application will make them disgorge the blood they have swallowed. Some leechers draw the leeches from the tail to the head through their fingers, and thus squeeze out the blood, after which all that is necessary is to put them in clean water and change it frequently. Leeches which are gorged with blood should be kept in a vessel by themselves, as they are more subject to disease, and often occasion a great mortality among the others; and they should not be again used until they have recovered their activity.

“In cases where the bleeding from leech-bites continues longer than is desirable, it may be stopped by continued pressure, with the application of lint, or by touching the wounds with lunar caustic. It may sometimes be necessary, in the case of a deep bite, to sew the wound, which is readily done with a single stitch of the needle, that need not penetrate deeper than the cutis.”

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ARTICLE XLIII.—*On the Chlorides of Oxides.* By E. Durand.

[In reply to Article XXXI. page 205.]

My object in compiling the article upon the chlorides of oxides, which appeared in the first volume of this Journal, was to promote a knowledge of these useful compounds, and of their various employments, which were then but very im-



perfectly known in this country, especially as disinfecters. In order to bring my subject to the level of the science, I procured almost all the latest European publications; but the want of time, the fear of delaying the publication of the number, together with the circumstance of not having an opportunity of correcting the proofs myself, were the causes of the mistatement pointed out by Mr Cohen, and of the accidental insertion of the obnoxious sentence which has elicited his censure.

I have to apologize to Mr Faraday for having thus, inadvertently, attributed to him the error of Mr Philips, and, at the same time, to assure those who are in possession of the essay in question, that the whole sentence quoted by Mr Cohen, would, if seen in time, have been expunged, as belonging to notes written in the course of my investigation of the subject, but afterwards rejected. Its misplacement, uselessness and inconsistency are obvious. In other respects, I feel confident that I have represented faithfully the experiments and opinions of Mr Faraday upon Labarraque's liquid.

As to the points on which Mr Cohen entertains opinions different from those I advocated three years ago, I confess I could not then avail myself of the discoveries which have since been made; with regard to some, I have materially altered my sentiments; but upon others, I still dissent considerably from that gentleman.

The chlorides of oxides, although the subject of much inquiry and controversy, are not much better known at present than they were three years ago. Several eminent chemists persist in considering them as a simple combination of chlorine with a metallic base; others, with Berzelius, Liebig, and Dumas at their head, regard them as a mixture of a metallic chloride with a chlorite of an oxide; but whatever may be their composition, they are all acknowledged to be indebted for their essential properties to the presence of chlorine; they all possess a bleaching and disinfecting power proportionate to the quantity of this gas which they are capable of evolving; hence, it

would be absurd to suppose that Labarraque's liquid is preferable to any other, since a fresh solution of one part of common bleaching salt and twelve or fifteen of water can yield as much, if not more chlorine, at a cheaper rate.

The views to which Mr Gaultier de Claubry was led by his experiments upon the manner in which the chloride of lime is decomposed by the carbonic acid of a vitiated atmosphere, are too well established, and sanctioned by too many authorities, to be easily overturned by the opinions of Mr Cohen, founded as they are upon a single unsuccessful experiment. Gaultier's theory is advocated by almost all the modern writers upon chemistry, is opposed by none, and by some is even extended to all the chlorides of oxides, without distinction of base. If Mr Cohen has exposed, for a whole month, to the atmospheric influence, a filtered solution of chloride of lime, without perceiving a pellicle on the surface of the liquid, or a precipitation at the bottom of the vessel, it was probably because he chose for the experiment a peculiar atmosphere free from carbonic acid; or, rather, because the chloride employed by him had already undergone decomposition. An atmosphere vitiated by miasmata, always contains a large proportion of carbonic acid: in fact, what happens during the putrefaction of organic bodies? In that condition, these substances absorb a considerable quantity of the oxygen of the air; but, at the same time, they evolve a volume of carbonic acid equal to that of the former gas. The same phenomenon takes place also during respiration. A foul air will, of course, act more powerfully towards the decomposition of a chloride of an oxide than a pure atmosphere.

I have frequently repeated the experiment of Mr Cohen, but always with a different result. Let any one try it for his own satisfaction, with a solution recently made from a good chloride, in a heated room or in a vitiated atmosphere, and he will arrive at the same conclusion. On breaking the first pellicle, it sinks to the bottom of the vessel, and a new one is genera-

ted. When the liquid has been evaporated almost to dryness, by successively breaking the pellicles as they form, let some water be poured upon the residue, in order to separate the chloride of calcium and chlorate of lime which are generated at the same time, or existed previously in the solution, throw the whole upon a filter, wash well and dry in the air, the residue will prove to be a pure carbonate of lime.

The identity of the impure chloride of soda, prepared according to Labarraque's formula, with that obtained by the more simple process of Payen, has been also admitted by all the authorities; and Mr Cohen will deserve great credit if he succeeds in proving the contrary. If he will take the trouble of considering the basis upon which Payen establishes this identity, he will, I am sure, find reasons for changing his opinions before proceeding any farther.

Payen first ascertained the mean proportion of chlorine contained in Labarraque's solution, and compared it with the proportion of this gas in chloride of lime of 98° of Gay Lussac's chlorometer. The result of his experiments was, first, that one part by weight of this chloride is equivalent to twenty parts of Labarraque's liquid; second, that one hundred parts of chloride of lime are completely decomposed by one hundred and thirty-eight parts of crystallized carbonate of soda; and, lastly, that sixty-eight parts more of this salt, added to the neutral solution of the chloride, are sufficient to render the compound as permanent as Labarraque's. The whole difference between these two preparations consists, then, in the larger proportion of carbonate of soda contained in the latter solution; a circumstance accounting for its greater specific gravity; but the specific gravity of these chlorides has nothing to do with their essential properties. I have experimented much upon these different preparations, and my opinion is very decided as regards their relative value; the formula of Payen, strictly adhered to, will always lead to an uniform preparation, equal in every respect to that obtained by Labarraque's process.

By reducing to one half the proportions of water employed in the solutions of chloride of lime and of carbonate of soda, a highly concentrated chloride of soda, marking  $12^{\circ}$  of Baumé's areometer, is obtained, very superior to the common disinfecting liquid.

Both Payen and Labarraque's solutions are equally permanent, although subject to slow decomposition; when evaporated to dryness, the results are the same; no chlorine is evolved during evaporation; the saline mass obtained preserves the odour peculiar to the original liquid; redissolved in water, its bleaching power is still very great, and it yields, as an ultimate result, a bicarbonate of soda mixed with a small quantity of chloride of sodium.

It is very true, that the employment of sulphate of indigo for ascertaining the strength of the chlorides of oxides, i. e. the relative proportion of chlorine they contain in each specimen, may occasion many inaccuracies; but such as it is, I consider it yet as constituting the only good method we have for testing the impure chlorides of soda. Morin's chlorometer, established upon the decomposition of the chloride of lime by means of the chloride of manganese, is not adaptable to the solution of Labarraque. Marozeau's, founded upon the solubility of bichloride of mercury, generated by the action of the chlorine (evolved from a solution of a neutral chloride of an oxide by means of an acid) upon the simple chloride of that metal, requires modifications, before it can become useful in enabling us to compare the strength of mixtures of a chloride of an oxide and a carbonate, because both chlorine and carbonic acid are evolved at the same time. It must be confessed, however, that some means or other must be resorted to for the purpose of ascertaining the strength of these compounds. Repeated trials with a solution of indigo, proper management, and a certain degree of experience with the various shades produced in these solutions by the addition of a solution of a chloride of an oxide, will enable any one to acquire a great accuracy in ascertaining the power of the impure chlorides of



soda. Morni's and Marozeau's chlorometers are merely intended for the chloride of lime, an article of much more importance to the arts and to medicine than the liquid under consideration.

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ARTICLE XLIV.—*On the Vegetable Emetics of the United States.* By R. Eglesfeld Griffith, M.D.

In a former number, when noticing those South American plants to which the name of Ipecacuanha has been indiscriminately applied, we stated that it was our intention to give a corresponding sketch of those native vegetables which are said to be possessed of emetic properties. The following notes are an attempt to redeem that pledge, and though exceedingly imperfect, contain, we believe, the sum of our knowledge respecting this interesting portion of our materia medica. In presenting them to our readers we have followed in their arrangement that adopted by M. Lemaire Lisancourt in his "Memoir on Vegetable Substances employed in Medicine, and known in commerce under the name of Ipecacuanha," except that we have made use of the natural orders as given by Professor Lindley, instead of those of Richard, whose classification is adopted by M. Lisancourt. We have been induced to pursue this plan, from the circumstance of the republication of Professor Lindley's learned and truly excellent work in this country, and the great probability that exists of its becoming the general text book, whilst, on the contrary, the treatise of his co-labourer in science is scarcely known, even by name, except to those who have made some progress in their botanical acquirements. The study of the natural orders and affinities has been too much overlooked in the United States, and

although we do not regard this system as accomplishing the views of its votaries, it cannot be denied that it has shed lights on the science which could never have been diffused by that of the Swedish naturalist.

It is not till we arrive at the third class or RANUNCULACEÆ, that we find any plants possessed of emetic qualities, those belonging to the ARALIACEÆ and UMBELLIFERÆ for the most part being endowed with antispasmodic or narcotic properties. Many of the third class, however, are violent stimulants, and capable at the same time of inducing emesis. The roots of several species of *Ranunculus*, as the *bulbosus*, *acris*, *flammula*, &c. are so acrid in their fresh state as to be used as epispastics; this caustic principle, however, like that of the *Arum triphyllum*, is so volatile as to be destroyed by almost every agent; the mere process of drying being capable of destroying it. Very few plants of the class PAPAVERACEÆ are distinguished for their emetic powers, and of those indigenous to the United States two only require notice, the *Sanguinaria Canadensis* and the *Argemone Mexicana*. The root of the first of these, of which a full account has been given in a former number of this Journal, is a powerful emetic in doses of from ten to fifteen grains; it requires great caution in its administration, and is seldom employed for this purpose. Of the *Argemone Mexicana* we know but little as respects its medical qualities, though it is said that the seeds are used in the West Indies as a substitute for Ipecacuanha, and Ainslie states that the Hindoo doctors consider the juice as a valuable remedy in ophthalmia.

As far as is known, no native vegetable belonging to any of the classes from the fourth to the sixty-second is endowed with emetic powers, with the exception of the eighteenth or the CALYCANTHEÆ, and this is doubtful; it is however stated that the bark of the root of the *Calycanthus Florida* will produce violent vomiting; if so, it is a strange anomaly, as the bark of the stem is a pleasant aromatic. In the sixty-second class or the ARISTOLOCHIÆ are found the *Asarum* and *Aristolochia*, which we here notice to correct some erroneous statements

which have been promulgated respecting them. Thus M. Lisancourt states that the *Aristolochia serpentaria* is much used in the United States as an emetic, quoting Chapman as his authority. Now this writer states just the reverse, properly observing that "it is rarely offensive to the stomach" and "is suited to check vomiting and tranquillize the stomach." The *Asarum Canadense*, although closely resembling its European congener in form, does not appear to possess the emetic qualities of that plant; on the contrary, it is a warm and aromatic stimulant. The emetic powers attributed to its leaves are, as is suggested by Barton, in all probability owing to the quantity taken, rather than to their inherent activity. The sixty-fifth class, THYMELÆÆ, is strongly characterized by the causticity of the bark of almost all the species belonging to it; this is strongly marked in the only one of the order indigenous to this country, the *Dirca palustris*, the fresh root and bark of which will vesicate the skin in about twenty-four hours. They have also been resorted to as emetics in the dose of five or ten grains, but from their acid character, this practice is unsafe, and liable to unpleasant results.

The order of ROSACEÆ affords a striking proof, that however natural may be the classification of plants, it is by no means a certain criterion of uniformity of remedial properties; thus this beautiful class includes species of the most opposite powers, for whilst the generality of them are astringent, others possess diametrically opposite virtues; the *Brayera anthelmintica* is one of the most powerful anthelmintics hitherto discovered, and the genus *Gillenia* furnishes one of the best substitutes for Ipecacuanha, if general opinion is to be received as evidence of truth; some doubts, however, of the powers of this remedy have lately been entertained, and the subject requires a thorough investigation; in our last number having dwelt on this point at some length, it would be useless to repeat the arguments in this place.\*

\* Vid. Journ. Pharm. Vol. IV. p. 177, et seq.

The extensive and splendid family of LEGUMINOSÆ presents among the species included in it, almost every variety of medicinal power, among which that of producing emesis is by no means the most rare, though this is not the case as regards our native species, of which only two have been reported to be endowed with vomitive qualities. The *Baptisia tinctoria*, says Dr Thatcher, "in the hands of some physicans is found to operate in a large dose, with much severity as an emetic and cathartic;" from trials, however, made by Dr W. P. C. Barton, it appears that in doses of twenty or thirty grains no such results are to be obtained, but as an external application to ulcers, &c. there is the most unequivocal testimony of its beneficial qualities. The inner bark, and especially of the root of the *Robinia pseudacacia*, which is sweetish, is also used by the Indian doctors, as they are termed, to fulfil a variety of indications; in large doses it is said to produce a full emetic effect.

Among the MYRICÆ, the only species that we are called upon to notice is the *Myrica cerifera*, a plant of no inconsiderable medicinal utility. The bark of the root is spoken of by some practitioners in the highest terms as a safe and effectual emetic. Among the rest, Dr James Mann, who gave it a fair trial, thinks that it is equal in strength to Ipecacuanha.

The next class, or JUGLANDÆ, furnishes no species possessed of emetic properties, but its successor, or the EUPHORBIACÆ, abounds in them, in fact, almost every plant belonging to this great class appears to be endowed with some active quality. The genus *Euphorbia* itself is by no means the least distinguished among them, almost every species having medicinal qualities of a very decided character. It would lead us into too great detail and deviate too much from the intention of these notes to advert to any of these species, except to those peculiar to this country; the fullest information, however, on this subject may be obtained from the learned monograph of M. Adrien de Jussieu and the more condensed though admirable account of Professor Lindley; it may be generally stated,



however, that all the species are endowed with analogous properties, which are energetic in proportion to the warmth of the climate in which they are found. All parts of the plant possess these active qualities, the juice, and especially that of the roots of the perennial species, being acrid and emetic, whilst the seeds afford a purgative oil. The native species which have most strongly attracted attention are the *E. ipecacuanha* and *E. corollata*, though there can be little doubt but that other species, as the *E. marginata* and *E. cyathophora* are equally deserving of investigation. The root of the *E. ipecacuanha* is a safe and efficient emetic, when given in the same doses as the true Ipecacuanha, and has been substituted for it with unequivocal success. According to Dr W. P. C. Barton, its various compounds, as Dover's powder, &c. are fully equal to those made with the foreign root. The *E. corollata* appears, however, to be preferable in many respects to the preceding, one of which, and not the least important, is the fact of its possessing no unpleasant taste, it is certain and mild in its operation, and acts as a purgative when it fails in exciting a discharge from the stomach. The dose is from fifteen to twenty grains, but as with Ipecacuanha, it may be increased without producing any unpleasant effects. The medical profession are principally indebted to Dr Zollickoffer for investigations into the real value of this plant; in his opinion, it is equal to the *Cephælis*, and he adds, what is seldom the case with medicinal roots of the emetic class, that its virtues are very little impaired by boiling.

The order CELASTINEÆ has not been sufficiently investigated to enable us to say any thing definite with regard to the general properties of the plants composing it. A native species, however, the *Celastrus scandens* is made use of by empirics to fulfil various indications, among which is that of producing emesis, and in all probability is the plant alluded to by Dr B. S. Barton, who states that it was much used among the Indians; the part used is the bark; a great objection to its use is the largeness of the dose required to produce the intended effect.

The order of the **POLYGALEÆ** contains many plants of decided, but opposite powers, though a bitterness in the leaves and milk of the root are their most general characteristics. In the genus *Polygala*, many of the species are eminently emetic, particularly the *P. glandulosa*, a native of China, which is held in the highest estimation in that country as a panacea ; the *P. poaya*, recently described by Dr Martius, and of which we gave a short account in a former paper, is also an excellent substitute for the true Ipecacuanha. Neither are some of the North American species destitute of this quality, the *P. senega* is a well known and deservedly esteemed article of the materia medica, and though it is seldom employed merely with reference to its vomitive powers, except in cases of children, and in a compound form, it holds an important place among the emetic medicines ; another native species, the *P. sanguinea*, is also stated to be endowed with similar qualities, though not in an equal degree.

In the great family of the **VIOLACEÆ** : all the species appear to be more or less possessed of emetic properties, more especially those which are natives of warm climates. The genus *Viola* has not been sufficiently investigated as regards its medical powers to enable us to assign to it its true rank ; from the researches of M. Boullay on the *V. odorata*, it appears that if the active properties of this plant are owing to the presence of a peculiar principle, resembling Emetine, and which he terms *Violine*, it is most probable, from the acrid and nauseous taste of several of our native species, that they would prove eminently emetic, this is particularly the case in the *V. cucullata* and *V. primulifolia* ; these plants deserve a thorough investigation of their powers.

The small order of **PHYTOLACCEÆ** furnishes a very important addition to our emetic roots, in that of the *Phytolacca decandra*, which, notwithstanding the eulogies bestowed upon it by several distinguished and competent observers, has been much neglected by our medical men. Professor Bigelow observes of it, that “in its medicinal properties, the root of the

*P. decandra* approaches nearer to Ipecacuanha than any American vegetable I have hitherto discovered," "when properly prepared, it operates in the same doses and with the same certainty as the South American emetic." The medical virtues of this plant are not confined to its powers as an emetic, as Dr Zollickoffer states that he has found the juice of the berries of great efficacy in the cure of chronic rheumatism.

Among the species composing the class of ILICINEÆ the utmost discrepancy of properties is to be recognized, for whilst the *Ilex Paraguensis* yields an almost indispensable beverage to the inhabitants of a large portion of South America, and the *Prinos verticillatus* is eminently tonic and astringent, other species furnish the most active emetics; this is peculiarly the case with some which are indigenous to this country; thus the *Ilex cassine*, Michaux (*I. vomitoria*, Lin.) and the *I. dahoon*, Michaux (*I. cassine*, Lin.), are possessed of strongly marked emetic qualities, and form the principal ingredient of the black drink of the southern Indians, used before commencing their religious rites and great councils. Rafinesque states, that other plants of this class are also used for this purpose, as the *C. ramulosa*. The above-mentioned species of *Ilex* are, however, but seldom made use of as emetics by physicians, from being very uncertain in their effects.

The class of LOBELIACEÆ presents a rare instance of uniformity of properties in the species composing it; they are all active and dangerous from the great acridity of their juices; this is particularly the case as respects the genus *Lobelia*, one species of which, the *L. longiflora*, a native of some of the West India islands, is stated by Lindley to be one of the most venomous of plants. When taken internally, it causes such violent irritation of the bowels, that no treatment can arrest the discharges, which generally end in death. Closely allied to this in virulence is the *L. inflata*, a native plant, which, unfortunately for humanity, is too universally known to the most of empirics infesting our country. No one of the vegetable productions of the United States requires more caution in its employ-



ment; its operation as an emetic is speedy, violent and durable, succeeded by a general relaxation and debility of the vital powers, and in more than one instance, by death. At the same time, like all other heroic remedies, it has proved eminently successful in the hands of skilful practitioners, though from the circumstance above alluded to, the good has never been commensurate to the evil.

In the immense class of *COMPOSITÆ*, but few real emetics are found, though some of the species are resorted to for this purpose in the form of a warm decoction, when in all probability the quantity of warm water taken, aided by the stimulating properties of the vegetable, produce the intended effect. The most celebrated of these are the *Eupatorium perfoliatum*, which, whatever may be its true value as an emetic, is of indisputable utility, both as a diaphoretic and a tonic, which properties it enjoys with several of its congeners. The *Anthemis cotula*, has also enjoyed considerable reputation as an emetic and diaphoretic, but is far more unpleasant and less efficacious than the *Anthemis nobilis*.

The *ASCLEPIADEÆ* are generally acrid and stimulating plants, and hence possessed in some instances of emetic qualities; those peculiar to the United States have, however, received too little attention to enable us to speak with certainty as to their true powers. The *Asclepias incarnata* has been employed by several physicians, who speak of it as a useful emetic and cathartic, and from information we have received, it would appear that the *A. syriaca*, *A. obtusifolia*, &c. are also entitled to notice in this respect.

Much more, however, is to be expected from the *APOCYNÆ*, which are endowed with higher powers, as is instanced in the different species of *Strychnos*. Among those which are indigenous to the United States, the *Apocynum androsa-nifolium* has attracted the most notice, though it is more than probable, that all our native species of this genus possess analogous powers. The powdered root of this plant proves a safe and effectual emetic in doses of thirty or forty grains, rarely



producing any of the unpleasant effects so common after the administration of many of our native remedies of the emetic class. There is one great disadvantage attendant on the use of this plant : the root must be used soon after it is gathered, as its powers are considerably impaired, and even destroyed, by keeping. It is also extremely nauseous and bitter, and therefore is not likely to come into general use.

The SCROPHULARINÆ are, in most cases, acrid plants, some of which have been used as emetics. The *Gratiola officinalis* of Europe acts as an emeto-cathartic, and in all probability its closely allied native congener, the *G. aurea*, is possessed of the same qualities. The different species of *Leptandra* have also obtained some celebrity among the Indian or botanical doctors, as emetics and cathartics ; they are violent in their action, and repulsively nauseous, and will therefore be little likely to be adopted in regular practice.

The class SOLANÆ abounds in active and dangerous plants, whilst at the same time it furnishes the most important article of vegetable food known to man—furnishing thousands with their only means of subsistence. Not the least celebrated of its species is the *Nicotiana tabacum*, a plant whose emetic powers are of a very high order, though the violence of its action prevents it from being often employed internally. As an external application, however, it is frequently resorted to, where the most speedy evacuation of the stomach is required, as in cases of poisoning, &c. In croup, also, the late Dr Godman found it extremely efficacious, applied to the outside of the throat, inducing vomiting and a relaxation of the spasmodic contraction of the glottis, when all other means had failed.

The medicinal properties of the plants composing the class BIGNONIACEÆ, are but little known ; it is, however, stated by Rafinesque, we know not on what authority, that the wood of the *Catalpa cordata* is possessed of emetic qualities, and another closely allied plant, inhabiting South America, the *Bignonia copaia*, according to Aublet, is eminently emetico-cathartic.

The VERBENACEÆ are of little importance in a medical point of view. The *Verbena hastata* is said to be emetic, and is made use of by empirics, some of whom esteem it as nearly equal to their great panacea, the *Lobelia inflata*.

The Monocotyledonous plants present but few orders possessed of active qualities, among which the AMARYLLIDÆ are confessedly the most important. The plants of this order all contain a peculiar principle, which is thought by Decandolle to be analogous to that of the squill. The roots of the *Pancratium maritimum*, and perhaps those of the other native species, are possessed of emetic properties when fresh, which almost disappears when they are in a dried state. Some years since a quantity of them were sold in this city for those of the squill, but proved almost inert.

The roots of some of the IRIDÆ are emetico-cathartic, and have been used for that purpose. The juice of the roots of the *Iris versicolor*, &c. sometimes acts violently even in small doses. M. Thouery thought he discovered emetine in the root of the *Iris Florentina*, which would explain the source of the active qualities of these plants; his discovery, however, has not been confirmed. Vogel also examined this species, but with different results.

The MELANTHACEÆ are almost universally poisonous, and this character is marked in no species more strongly than in the *Veratrum viride*, a native plant of considerable powers as an emetic, requiring great caution in its administration; it acts tardily in discharging the contents of the stomach, and has the further disadvantage of almost invariably causing unpleasant general effects. It owes its power to the presence of a peculiar principle termed Veratrine, which is also found in the *Colchicum*. The *Veratrum* is principally used as an external application to cutaneous eruptions, and even in such cases has not unfrequently caused emesis and great gastric distress. The roots of the *Helonias dioica* are also used, according to Dr Dana, as an emetic in domestic practice in Ohio.

Among the ASPHODELEÆ many plants of considerable emetic properties are to be found, at the head of which is the *Scilla maritima*, and the root of a native species, the *Aletris farinosa*, although a powerful tonic in small doses, acts as an emetic when administered in any quantity, also causing unpleasant general symptoms, as dizziness and narcotism.

In the class SMILACEÆ are also included some active plants, whose properties have not been sufficiently investigated. The roots of all the species of *Trillium* are acrid and emetic, but have been but little resorted to for this purpose; as regards the *Medeola virginica*, although Shœpf supposed it might prove analogous in its effects to Ipecacuanha, it does not appear to be possessed of any decided powers, as it is eaten by the Indians; in large quantities it is said to be diuretic, like the *asparagus*.

The beautiful class of LILIACEÆ are more remarkable for the brilliancy of their flowers, than for any medical virtues they possess. One species, however, the *Erythronium americanum*, has obtained some notice for its emetic powers; these are most striking when the plant is in a fresh state, when twenty or thirty grains will act with some violence, whereas, after keeping for some time, double the quantity often fails in producing any effect. It has been proposed by Bigelow as a substitute for *Colchicum*, but many other plants of much more power might readily be selected.

With regard to the remaining classes of this order, and those belonging to the VASCULARES, we have but little information that is definite, of emetic qualities being possessed by them; it is highly probable, however, that many of them are endowed with this power, especially among the *Fungi*.

It may be perceived from the above sketch that we have but few native vegetables which can be substituted with certainty or safety for Ipecacuanha, and even these have not been sufficiently investigated to enable us to come to a satisfactory conclusion as respects their true powers. Enough, however, is known respecting them, to induce a belief that the best substi-



tute for the foreign root is either the *Phytolacca* or *Gillenia*, for although the *Euphorbia ipecacuanha*, *E. corollata*, and the several species of *Apocynum* are entitled to consideration, their acrimony and stimulating properties render them unfit for indiscriminate administration where emetics are required.

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ARTICLE XLV.—*Note on the Solution of Proto-iodide of Iron (Hydriodate of Protoxide of Iron). By E. Durand.*

This therapeutic agent was lately introduced into medical practice in Philadelphia by Dr Samuel Jackson, on whose recommendation it is now pretty extensively used in this city and in some parts of the country. Dr Jackson first applied to me for this article, of a strength nearly equal to that of his solution of ioduretted iodide of potassium, and, as far as I am able to ascertain, I have since been the only preparer of this medicine, generally prescribed by the name of Dr Jackson's solution of iodide of iron. The process which I have followed in the preparation of this article is that of MM. Baup and Caillot, as described at page 201 of the first volume of this Journal, in the article "*Iodide of Potassium*" of a translation headed "*On the Preparation of the Iodides.*" As I have made some alterations in the proportion of the iron filings, to avoid the production of a per-iodide of iron, and in that of the water, which I have increased in order to dilute the solution to the desired strength, I will here state in full my own formula:

R. Iodine	3 x.
Iron filings, perfectly pure and unoxidized	3 v.
Distilled water	3 xii ss.

Put the iodine into a porcelain capsule, with one half the quantity of water above directed, add the iron filings by small



portions, stirring the mixture with a glass rod.\* The combination soon takes place; heat is evolved with a disengagement of a small quantity of vapours of iodine, and the mixture acquires an orange colour, which gradually deepens to a dark red. When the whole of the iron has been added, the capsule is put on a sand bath or over the flame of a spirit lamp and heated slowly; continuing to stir the liquid. An ioduretted hydriodate of iron is first produced, which, by the action of heat, soon passes to the state of a simple hydriodate. This point is indicated by the entire discolouration of the solution. In this state it is filtered, and the dregs and filter are carefully washed with the remaining half of the distilled water, previously heated to the boiling point. In this manner a solution forming twelve and a half fluid ounces is afforded, one ounce of which represents one drachm of iodide of iron.

This solution, which at first is colourless, acquires a deep red colour by standing, and precipitates some oxide of iron. It is thus reduced to the state of an ioduretted hydriodate of iron; but it may easily be restored to its former state by heating it again with a small quantity of iron filings, until the liquid becomes colourless. As this decomposition might take place when in the hands of persons unacquainted with chemical manipulation, and in order to avoid the trouble of recomposing it, I will suggest the propriety of preparing at once the iodide of iron and forming the solution when prescribed, of a strength suitable to the purposes of the physician, or equal to that of Dr Jackson, that is, one drachm to the fluid ounce. I am the

\* The translator of the article headed "On the Preparation of the Iodides," has not rendered the sense of the text, when saying, "If proper care be not observed when the water is added to the iodide, so much heat will be disengaged as in great measure to volatilize this substance, and endanger the breaking of the vessel." The text recommends, on the contrary, not to mix the iron with the iodine before this substance be immersed in the water, otherwise its action upon iron is so powerful that it disengages much heat, by which a portion of the iodine is volatilized. Water has no other action upon iodine, except that it dissolves about one-seven thousandth, by which it acquires an orange colour.

more inclined to recommend this method, as I have remarked that solutions made directly from the iodide are not so liable to decomposition.

The iodide of iron is obtained by evaporating to dryness, the above filtered solution, taking care, towards the end, to stir it incessantly with an iron spatula, and to detach the salt from the bottom of the capsule, as it forms. The heat must be managed with the greatest care, diminishing it gradually, and removing quickly the capsule from the fire as soon as the odour of iodine is evolved. The above quantities yield about twelve drachms and a half of iodide. This salt is of a greenish black colour, passing to a metallic grey if the heat is too strong or too protracted. Its taste resembles that of chloride of iron; it is, like this salt, very deliquescent, and requires of course to be kept in small bottles well stopped. Its solution, when the iodide is well prepared, is of a light orange colour, and deeper in proportion to the decomposition which some parts may have undergone towards the end of the operation.

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ARTICLE XLVI.—*Note on the Œnothera Biennis.* By R. Eglesfeld Griffith, M.D.

No change in the materia medica has been more strongly marked than the almost exclusive employment, during a long succession of ages, of vegetable remedies, and their subsequent disuse in favour of those derived by the aid of chemistry from the mineral kingdom; to trace the causes which led to this change would be extremely interesting and instructive, but would by no means accord with the practical character of our work. That man, in the early stages of civilization, always

resorted to the vegetable world for remedies to assuage pain and alleviate disease, is a fact too well established to require proof, and it is equally certain that his hopes were not disappointed; when, however, medicine, instead of being considered as a sacred calling, became a mere trade, a strong temptation arose among competitors in the art, to employ the most active means, in order that they might produce rapid and conspicuous effects. A better state of things, however, has now dawned upon us, and the powers of nature, instead of being derided and even thwarted, are now consulted and aided as much as possible.

In no department of the healing art was this more strikingly exemplified than in the treatment of cutaneous diseases; but a few years since, the usual remedies resorted to for their cure were the different preparations of lead and mercury, or even those of a more caustic character; a more correct physiology has, however, shown that much more benefit is to be derived, at least in a majority of cases, from the employment of milder means. The use of emollients, &c. have also the additional good effect of never occasioning the terrible sequelæ which too often follow the use of the more heroic remedies.

We have been led to these remarks from the benefits we have seen to result from the employment of a therapeutic agent, whose virtues are scarcely known, in the cure of obstinate eruptions. We allude to the *Ænotherabi ennis*, or evening primrose, called also, and more especially in New England, by the name of *Scabish*, a corruption, as is observed by Dr Bigelow, of *Scabious*, with which plant, however, it has no affinity. It may also be well to remark, that it is very different from the plant generally known in New Jersey by the same vulgar name; this is the *Erigeron Philadelphicum* or *E. Canadense*, for both are indiscriminately made use of.

The *Ænothera biennis* is a tall perennial plant, very common on the borders of fields and in natural hedges, and is also, though *more rarely*, to be found in thickets along water courses.

*Ænothera*. Octandria monogynia. Lin. sex. syst. Onagræ.

Juss. Nat. ord. *Calyx* tubulous, 4-cleft, segments deflected, deciduous. *Petals* 4, inserted upon the calyx. *Stigma* 4-cleft. *Capsule* 4-celled, 4-valved, inferior. *Seeds* naked, affixed to a central 4-sided receptacle. *Nuttall*.

*Æ. biennis*. *Stem* villous, scabrous. *Leaves* ovate lanceolate, flat. *Flowers* terminal, subspicate-sessile, with the stamens shorter than the corolla. *Willdenow*.

*Æ. Mollissima*. *Walt?*

*Icon*. Mill icon, t. 89. fig. 2. Flor. Dan. 446. Lamarck. Illus. t. 219. fig. 1.

*Description*. Stem from three to five feet high, rough, hairy and branching. Radical leaves petiolated; cauline leaves sessile, both pubescent, and more or less dentate. Flowers solitary, sub-axillary. Ovary sessile, 4-grooved, inferior, surmounted by a long tubular calyx, which divides into four reflexed segments. Petals large, rounded, sometimes emarginate.

When this plant grows in secluded situations, the leaves become covered with a white mucor, giving them a highly pubescent appearance. On cultivation, the flowers of this plant become of a much deeper colour and of a larger size, resembling those of the *Æ. grandiflora*. They expand in the evening, just at the commencement of twilight, and continue open till the sun begins to acquire some power the succeeding morning. The same flower does not expand a second time. Pursh states that he has "frequently observed a singularity in this plant, and it might be interesting to make further inquiry into its cause; it is, that in a dark night, when no objects can be distinguished at an inconsiderable distance, this plant, when in full flower, can be seen at a great distance, having a bright white appearance, which probably may arise from some phosphoric properties of the flowers."\*

The medical properties of the plant under consideration,

\* Flora, Am. septen. 1, p. 261.



appear to be confined to the bark ; these, in a recent state, are mucilaginous, and leave a slight sensation of acridity in the fauces after being chewed ; this latter is not so perceptible after the plant has been dried, though this process does not appear to diminish the quantity of mucilage.

Accidentally hearing of the powers of a decoction of the *Œnothera* in the cure of infantile eruptions, I was induced to give it a trial in several cases of an obstinate character, which had resisted the most approved plans of treatment, and have been so well satisfied that its virtues in the alleviation of these cutaneous affections were not overrated, as to resort to it habitually, not only in these complaints, but also in many others of even a more severe character. In one case of *Herpes zona*, its good effects were strikingly visible in a short time. In the cure of *tetter*, often a very rebellious disorder, it has also proved highly useful.

The plant is to be gathered about the flowering season, and the small twigs, with the bark of the large branches and stem, retaining with them the leaves, to be dried in the shade. Of these a strong decoction is to be made, with which the eruption is to be bathed several times during the day.

From some trials I lately made with this article, it also appears to possess the abstergent qualities of the *Quillea saponaria*, though not in an equal degree, though fully as much so as the *Saponaria officinalis*.

Since writing the above, in looking over the Herbarium of the late Dr B. S. Barton, now in possession of the American Philosophical Society, I found that one of the specimens of the *O. biennis* was labelled “King cure-all in sores,” proving that its emollient properties were also popularly known in another class of diseases.

ARTICLE XLVII.—*Pharmaceutical Notices.*—No. 6.

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jus est  
Judiciumque. *Horace.*

*Morphia.*—Among the Pharmaceutical Notices inserted in the last number of this Journal, is one headed *Morphine*, and signed A., in which I have remarked, with some degree of regret, the following sentences: “*The French morphine contains one third its weight of narcotine, &c.*” And below: “*Sulphate of morphine is, when pure, beautifully white, not at all possessed of a brown shade like that of the French, &c.*” I cannot conceive what has been the cause of this abuse upon these two articles, unless it were that they are of French origin. Whether it be from national prejudice or ungenerous motives on the part of their author, it is not my business to inquire? But I challenge A. to produce any morphine or its sulphate, lately and directly imported from the laboratory of any respectable chemist in France, that will answer to the description he so confidently gives to all these French products indiscriminately.

I confess that A. would have been perfectly justifiable in cautioning the public against spurious articles sold in this country, and which, with counterfeit labels and seals of respectable houses in Paris, are daily imposed upon our druggists as genuine. To such he might, perhaps with justice, have affixed his stigma; but I deny the bearing of his assertion on those preparations which come directly from Messrs Robiquet, Pelletier, and other well known chemists, who are largely engaged in the manufacture of these delicate chemicals. I have seen and manipulated much of their morphine and sulphate of morphine, and have always found them, to say the least, equal in every respect to the same preparations made in this country, or imported from England or Germany.

After the honest and public avowal made some time ago by

the French chemists themselves, it is obvious that I will not pretend to affirm that their morphine has always been entirely free from narcotine; but such as it was formerly, they themselves, as well as every chemist acquainted with their high standing as men of honour and science, considered it as pure, and as such it was launched into commerce *optimâ fide*. Nevertheless, their morphine was not inferior to that manufactured in any other country, for all the morphine then made was more or less contaminated with narcotine. This general defect arose from the imperfect knowledge as yet acquired respecting the nature of narcotine, and from the similarity of action, both of precipitants and of acids, generally, upon these two substances.

In the science of chemistry, which, though in its infancy, is so zealously cultivated in all civilized nations, error cannot long remain associated with truth; careful and protracted investigation soon separates the one from the other. The French chemists have not remained in arrears of others in the prosecution of this science; they were the first to ascertain and publish that morphine, even when carefully prepared agreeably to the best processes employed at that period, was still contaminated with narcotine; and to devise better means to obtain this substance in a state of purity. The result of their labours has not been unsuccessful, and the essays of Pelletier, Henry and Plisson, Guillermond, Girardin, Robiquet and others, still rank among the best that have been written upon this subject in any country. The last of these gentlemen published, more than a year ago, some interesting notes upon narcotine, which were translated for, and inserted in the number of this Journal for April last, and to which I take the liberty of referring the author of the article under consideration, as well as such of our readers as may desire to investigate this matter and ascertain the best methods of detecting the presence of narcotine in morphine or its salts.

I now ask in what light the strictures of A. upon French morphine and its sulphate can be viewed? Had his remarks

been directed against these articles generally, as not being constantly pure, but not against those prepared in France only, they might have been received as highly interesting to physicians and pharmacutists ; but in the shape in which they are presented, they must appear, to say the least of them, very illiberal and unfounded ; especially when we refer to previous notices from the same source, in which the author asserts that he has detected from fifteen to twenty-five per cent of sulphate of quinine in samples of "*what was termed genuine sulphate of morphine imported from France,*" and announcing in the following paragraph that he is manufacturing largely morphine and its salts. (See No. XIII, page 15, 16.)\*

E. DURAND.

*Quercia*.—In an extract from my Inaugural Thesis, published in the first volume of this Journal, page 97, it is stated a crystalline matter was obtained from the bark of the *Quercus falcata*, which, on the supposition of its being a salifiable base, *sui generis*, I called Quercia. Recent experiments have shown me the inaccuracy of my supposition, and proved it to be the sulphate of lime ; which has the peculiar property, then unknown to me, of dissolving without decomposition in dilute, sulphuric, nitric and muriatic acids, and separating from these solutions when concentrated, in long, silky, transparent crystals. It is also thrown down by ammonia, unaltered from its acid solutions : this property, and its solubility in dilute sulphuric acids, I think have not heretofore been recorded.

*Sulphate of Morphia*.—In recently preparing some sulphate

\* I have tried some sulphate of morphia received about a year ago from Mr Levallant's manufactory, with a view to investigate the degree of its purity. I have found that it gave by maceration in sulphuric ether, four per cent of a residue formed of colouring matter, narcotine, and a small quantity of morphine. This sample was rather inferior in appearance to others I have had from the same source. Its whiteness, however, was equal to that of sulphate of quinine. Let the reader compare this analysis with that of A. (one third of narcotine and twenty-five per cent of sulphate of quinine)!!!



of morphia I obtained some very large and hard crystals, the size and appearance of which led me to suppose that they might possibly be a triple salt of morphine and narcotine. An analysis, however, which I made, proved them to be pure sulphate of morphia. The size of the crystals was owing no doubt to very slow evaporation from a solution not very concentrated. Their form was the same as sulphate of morphia usually assumes.

J. SCATTERGOOD.

## REVIEW.

**ARTICLE XLVIII.**—*The Dispensatory of the United States; by George B. Wood, M.D. ; Professor of Materia Medica in the Philadelphia College of Pharmacy, &c., and Franklin Bache, M.D. ; Professor of Chemistry, in the Philadelphia College of Pharmacy, &c., 8vo. Philadelphia, Grigg and Elliot, 1833.*

A DISPENSATORY is a comprehensive manual for the medical and pharmaceutical communities. To the physician, it is the descriptive catalogue of the various substances supplied by abundant nature, and elaborated by art and experience for the cure of human ills. To the pharmacist, it is a book of daily reference, a chief source of his acquaintance with the history and properties of the materials of his business, the repository to which he looks for a criterion of their quality, and, next to the Pharmacopœia, his text-book and authority, for the strength and composition of his preparations. It is to be expected, then, that a work of so much importance, should contain, in a condensed form, the sum of the knowledge of the age, on those subjects of which it professes to treat ; that it should not content itself with the character of a mere record of the researches of former times, with a sprinkling, here and there, of more modern intelligence ; nor yet that it should, with the confusion of inexperience and ignorance, offer only an indiscriminate collection of the novelties and crudities of the day, a *rudis indigestaque moles*. But, looking with reverence on the labours of our fathers, it should cull from their pages all that is

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really and practically useful ; and keeping pace with the outposts of advancing knowledge, should gather and mingle with its treasure, whatever of modern discovery is important and well ascertained. It should be clear and consistent, in nomenclature, as well as arrangement ; and accuracy and individual research should characterise its pages.

How far the Dispensatories which have hitherto issued from the American press have answered this description, let the disappointments of the student, and the complaints of the profession, spare us the necessity of inquiring. The British works, moreover, from which our American Dispensatories have been chiefly compiled, are themselves little more than re-edited copies of a book certainly of acknowledged merit, but little adapted to the present state of our knowledge. Dr Lewis's Dispensatory, first published about the middle of the last century, has formed the ground-work alike of Duncan's and Thomson's Dispensatories ; and although much merit is due to these gentlemen, as editors, it cannot be denied that their labours are extremely incomplete. The public, in short, have been impatiently looking for a Dispensatory in the English language, adapted to the pharmaceutical, chemical, and medical knowledge of the times. We, therefore, hail with peculiar gratification, the volume whose title is placed at the head of the present article. We congratulate the American republic of letters and science on the appearance amongst us of a work of original and laborious research, sound learning and discrimination, and great practical utility. Glancing over its pages, we proceed to lay before our readers such a view of its contents as the limits of our present number will permit, referring them, with confidence, to the work itself, for a more intimate acquaintance with it.

This work, like most others of the kind, divides itself naturally into two parts ; the first, which occupies nearly two-thirds of the book, contains the various articles of the *materia medica*, alphabetically arranged ; and the second is devoted to the preparations.

“Under the head of *materia medica*,” say the authors, “we treat of medicines in the state only in which they are produced by nature, or come into the hands of the apothecary. Of these medicines, such as are recognised by our national *Pharmacopœia* are most minutely described ; but we consider also, all that are included in the officinal catalogues of the British colleges, and some others which appear to deserve attention from their present or former reputation.”

On entering this division, we shall take the liberty of offering a few miscellaneous observations ; and if others should occur as we proceed, our readers must pardon us for being somewhat desultory. We remark, in the first place, on looking over the book, the closeness of its page, and the condensed manner in which it is printed ; each page having, probably, one third more letter-press than the average of either Duncan’s or Thomson’s, and a fourth or fifth more than those of Dr Coxe. We notice, also, copious lists of synonymes, and great perspicuity in the physical descriptions of each article as an object of natural history. The arrangement which the authors have adopted seems to be this : first, the officinal name of the article in question, giving a proper preference to the nomenclature of the *Pharmacopœia* of the United States ; then its English or common name ; after this its definition in the *Pharmacopœia* of the United States ; next its officinal synonymes in the British *Pharmacopœias*, and its names in various foreign languages ; then its classification as an object of natural history, with its authentic characters and references to plates and descriptions. Afterwards we have its natural and commercial history, a specification of its physical properties, of its medical properties and uses, and lastly, an enumeration of the officinal preparations in which it occurs. On the history, natural and commercial, great labour of research and precision of observation appear to have been bestowed ; and indeed, with so happy a result in elucidating many confused or doubtful points, and furnishing to the druggist interesting commercial information, with a particular reference to the produce and drug-market



of this country, as, independently of the other merits of the work, to stamp it with an original and highly interesting character. The article on Cinchona, which occupies thirty-two of its closely printed pages, may be particularised as a monograph of great scientific value, and as giving the most satisfactory elucidation which we have seen, of that perplexed and difficult subject. We strongly recommend it to the reader's particular attention.

The article on vinegar is valuable, as are also those on some others of the acids, particularly the nitric and sulphuric, accompanied by tables of the actual strength of those acids at different specific gravities. The following notice of the manufacture of alum in this country, may be new to many of our readers.

“Alum has not been an article of import into the United States since 1818, or a year or two earlier ; the demand since then having been entirely supplied by the domestic manufacture. There are at present six establishments in the United States where alum is manufactured ; namely, two in Baltimore, one in New-York, and three in Massachusetts—at Salem, Roxbury and Newton. The aggregate quantity made in these works, may be estimated at from a thousand to twelve hundred tons. The method employed consists in the direct combination of sulphuric acid with clay. Lately, however, Messrs Tyson and Ellicott, manufacturing chemists of Baltimore, have commenced working the ore found at Cape Sable, on the Magothy river, Maryland. This ore, which was extensively worked during the late war, under the superintendence of Dr Troost, consists of lignite, clay, sulphuret of iron and sand. It exists in beds of from six to ten feet in thickness, covered by a stratum of sand. It is dug up and thrown into heaps of from one to three thousand tons, is set on fire, and continues to burn for years. The ashes are transported to the manufactory, where they are lixiviated and evaporated in leaden vessels. When the solution indicates about 25° of Baumé's hydrometer, sulphate of potassa is added, after which it is drawn off to crys-

tallise. At the end of about a week, the crystallization having been completed, the mother-waters are pumped off; and the crystals, after being washed and well drained, are dissolved in leaden boilers. From these the solution is transferred to the refining vessels, and left for about three weeks to crystallise. At the end of that time, the mother-waters are drawn off from the crystals, and these are broken up, dried, and packed in barrels."

Under the head "*Aqua*," p. 100 and 101, we have a useful synopsis of the constituents of a variety of mineral waters; and cannot but regret, that the authors were unable to add the analysis of the "White Sulphur" and "Salt Sulphur" springs in Virginia, which may be ranked among the most valuable mineral waters of our country.

Although the recently discovered elementary principle termed *Bromine*, can scarcely yet be considered strictly as an officinal article, its importance as a chemical agent, and the circumstance of its beginning to be used in medicine, have procured for it a place in this Dispensatory. For a full account of its chemical habitudes, we would refer the reader to Vol. II, page 89, &c. of this Journal; but to the physician, the following extract relative to its medical properties will not be without value.

"From the active chemical properties possessed by bromine, it might be presumed, *à priori*, to be a substance capable of exerting a powerful influence over the animal economy. Accordingly, experiments were very early instituted with it as a remedy. The result of the trials seems to prove, that like iodine, it increases the activity of the lymphatic system, promoting the absorption of scrofulous and other tumours, especially goitre. It has been exhibited in aqueous solution, as hydrobromate of potassa, and in the form of proto or deuto-bromide of mercury. The dose of the aqueous solution, containing one part of bromine to forty parts of distilled water, is about six drops, to be taken in the course of the day. The hydrobromate of potassa is given in the form of pill, in grain.

doses twice a day, gradually increasing to six or eight grains. Externally it is employed as an application to tumours, in the form of an ointment, in the proportion of a drachm of the salt to an ounce of lard. The two bromides of mercury are very analogous, in their mode of action, to the corresponding chlorides of the same metal. The deutobromide of mercury is a corrosive poison, and requires to be administered in minute doses. Dr Wernick, an Austrian surgeon, gave it in ethereal solution, made by dissolving a grain of the deutobromide in a drachm of ether, of which ten, fifteen, or twenty drops may be taken daily. Some authorities attribute more activity to the preparations of bromine than to those of iodine. Further observations, however, are required to determine the precise rank which bromine should occupy as a remedial agent.

“Bromine in overdoses acts as a poison. Its most active combination is perhaps the deutobromide of mercury, for which, as for the deutochloride, the best antidote is albumen.”

At page 152, &c., we have a good practical article on the *Cantharis*; but we would beg leave to suggest that in future editions the printer be instructed, that the plural of *elytron* is not “*elytræ*,” and we would also call the attention of the authors to a series of experiments lately instituted by Dr T. E. Beesley of this city, with a view to ascertain the circumstances, by which the power of cantharides to produce strangury may be effected; the results of which, if confirmed by future experience, will possess considerable importance. (See Vol. II, p. 271, of this Journal). The authors have very properly taken notice of the refutation, by Farines, of Perpignan, of the idea once prevalent, that the vesicating property of the insects was not injured by the mites which so frequently prey upon them, and reduce them to powder. “M. Farines has satisfactorily shown, that though the hard parts, left by these mites, possess some vesicating power, and the powder produced by them still more, yet the sound flies are much stronger than either.” Under the head “*Cantharis vittata*,” we have an interesting account of various species inhabiting the United

States, which have been employed as substitutes for the *C. vesicatoria*, and found to be equally efficient.

We observe that the ever-varying *Cardamom* is made to belong neither to *Amomum*, nor *Elettaria*, nor *Matonia*, but at length, *post tot naufragia*, to the genus *Alpinia*, on the authority of the celebrated Dr Roxburgh. It is to be hoped that this is its final destination.

Passing over the article on *Cinchona*, noticed above, we are tempted to extract the following elucidation of the true origin of Cinnamon, and the commercial history of that valuable aromatic.

“The cinnamon tree grows to the height of twenty or thirty feet, with a trunk from twelve to eighteen inches in diameter, irregular, knotty, and covered with a thick, rough, scabrous bark, which is externally ash-coloured, internally reddish. The branches are numerous, strong, horizontal, and declining. The young shoots are beautifully speckled with dark green and light orange colours. From the root spring numerous suckers, which form a bush about the trunk. The leaves are from six to nine inches long, and from two to three broad, entire, oblong, pointed, three-nerved, with the lateral nerves vanishing as they approach the point. They are in opposite pairs, and stand upon short slightly channelled footstalks. When young they are generally of a scarlet or light liver-colour, become olive as they approach maturity, are afterwards of a shining green, and ultimately, before they fall, of an olive-yellow. The flowers are small, white, and arranged in axillary and terminal panicles. The fruit is an oval berry, which adheres like the acorn to the receptacle, is larger than the black currant, and when ripe has a bluish-brown surface thickly scattered with white spots.

“The tree emits no smell perceptible at any distance. The bark of the root has the odour of cinnamon with the pungency of camphor, and yields this principle upon distillation. The leaves have a spicy odour when rubbed, and a hot taste. The petiole has the flavour of cinnamon. It is a singular fact, that the odour of the flowers is to people in general disagreeable,



being compared by some to the scent exhaled from newly sawn bones. The fruit when opened has a terebinthinate odour, and a taste in some degree like that of juniper berries. It is the prepared bark that constitutes the spice so well known and so highly valued under the name of cinnamon.

“ This species of laurel is a native of Ceylon, where it has long been cultivated for the sake of its bark. It also grows in Malabar; in Sumatra, Java, Borneo, Sooloo, and the neighbouring islands; and in Cochin-china, Tonquin, the Chinese province of Quangsi, the Philippines, the Nicobar Islands, and other parts of the East. It has at various periods been introduced into the Isle of France, Bourbon, the Cape de Verds, Brazil, Cayenne, several of the West India Islands, and lately into Egypt; and in some of these places it is at this time highly productive. This is particularly the case in Cayenne, where the plant was flourishing so early as the year 1755. It has been doubted whether the tree which grows in Sumatra, Cochin-china, &c., is the real *Laurus Cinnamomum*, or another species of the same genus. Some authors consider it a distinct species, with the name of *Laurus Cassia*; but there is reason to believe, both from the reports of travellers, and from the similarity of its product with that of the Ceylon tree, that the two plants are specifically identical, and differ only in consequence of the variety of soil and climate to which they are exposed. The *Laurus Cinnamomum* is exceedingly influenced, as regards the aromatic character of its bark, by the circumstances of soil, and climate, and mode of culture. Thus we are told by Marshall, that in Ceylon, beyond the limits of Negombo and Matura, in the western and southern aspect of the island, the bark is never of a good quality, being greatly deficient in the spicy, aromatic flavour of the cinnamon; and that even within these limits it is of unequal value from the various influence of exposure, soil, shade, and other circumstances.

“ *Culture, Collection, Commerce, &c.* Our remarks under this head will first be directed to the cinnamon of Ceylon, in

relation to which we have more precise information than concerning the aromatic obtained from other sources. The bark was originally collected exclusively from the tree in a wild state; but under the government of the Dutch the practice of cultivating it was introduced, and it has been continued since the British have come into possession of the island. The seeds are planted in a prepared soil at certain distances, and as four or five are placed in a spot, the plants usually grow in clusters like the hazel bush. In favourable situations they attain the height of five or six feet in six or seven years, and a healthy bush will then afford two or three shoots fit for peeling; and every second year afterwards will afford from four to seven shoots in a good soil. The cinnamon harvest commences in May and continues till late in October. The first object is to select shoots proper for decortication, and those are seldom cut which are less than half an inch or more than two or three inches in diameter. The bark is divided by longitudinal incisions, of which two are made opposite to each other in the smaller shoots, several in the larger, and is then removed in strips by means of a suitable instrument. The pieces are next collected in bundles, and allowed to remain in this state for a short time, so as to undergo a degree of fermentation, which facilitates the separation of the cuticle. The epidermis and the green matter beneath it are removed by placing the strip of bark upon a convex piece of wood and scraping its external surface with a curved knife. The bark now dries and contracts, assuming the appearance of a quill. The peeler introduces the smaller tubes into the larger, thus forming a congeries of quills into a cylindrical pipe which is about forty inches long. When sufficiently dry, these cylinders are collected into bundles weighing about thirty pounds, and deposited in the government warehouses. The East India Company, which has a monopoly of the commerce in cinnamon, employs inspectors, who open the bales and carefully examine every quill, dividing them into three sorts, two of which are intended for exportation, and the third, consisting of bark that is too old, or too

young, or altered by the weather, or inferior from some other cause, is rejected. The better kinds are put into bundles, and shipped for England in the Company's vessels at the ports of Galle and Columbo. The bark of inferior quality is either employed for preparing oil of cinnamon, or exported to the continent of India, whence much of it is said to reach Europe under the name of cassia.

“Immense quantities of cinnamon are exported from China, the finest of which is little inferior to that of Ceylon, though the mass of it is much coarser. It passes in commerce under the name of *cassia*. Travellers inform us that the best cinnamon produced in Cochin-china is quite equal to the best of Ceylon; but is monopolized by the sovereign of the country. The inferiority of that which circulates in commerce is probably attributable to the want of care in selecting and preparing the bark. It is supposed that most of the cinnamon obtained from China is imported into that country from Cochin-china and the islands of the Indian Archipelago; but we have good authority for the belief, that this spice is also cultivated within the limits of the Celestial empire.

“Cayenne, and several of the West India Islands, yield to commerce considerable quantities of cinnamon of various qualities. That of Cayenne is of two kinds, one of which closely resembles, though it does not quite equal, the aromatic of Ceylon, the other resembles the Chinese. The former is supposed to be derived from plants propagated from a Ceylonese stock, the latter from those which have sprung from a tree introduced from Sumatra.

“By far the greater proportion of cinnamon brought to this country is imported from China. It is entered as *cassia* at the custom houses, while the same article brought from other sources is almost uniformly entered as cinnamon. By an examination of the treasury returns from the year 1820 to 1829, we find that the average annual import of this spice has been, in round numbers, 652,000 pounds from China, 12,000 pounds from England, 9000 pounds from the British East Indies,



3000 pounds from the West Indies, and an insignificant quantity from all other places, with the exception of 12,758 pounds brought in one year from the Philippines. There is no doubt that much of the amount brought from China is exported ; but we have not been able to ascertain the proportion.

“ Though cassia and cinnamon were both terms used by the ancients, it is impossible to ascertain with certainty whether the spices which they designated were identical with those known by the same names in modern times. Neither the plants nor their localities, as described by Dioscorides, Pliny, and Theophrastus, correspond precisely with our present knowledge ; but in this respect much allowance must be made for the inaccurate geography of the ancients. It is not improbable that the Arabian or other Eastern navigators, at a very early period, conveyed this spice within the limits of Phœnician and Grecian, and subsequently of Roman commerce.

“ *Properties.*—*Ceylon cinnamon* is in long cylindrical fasciculi, composed of numerous quills, the larger inclosing the smaller. It is of a light yellow colour, almost as thin as paper, smooth, shining, pliable to a considerable extent, with a splintery fracture when broken. It has a pleasant fragrant odour, and a warm, aromatic, slightly pungent, sweetish and highly agreeable taste. When distilled it affords but a small quantity of essential oil, which, however, has an exceedingly grateful flavour. It is brought to this country from England ; but is very costly, and is not generally kept in the shops. The finer variety of *Cayenne cinnamon* approaches in character to that just described, but is paler, and in thicker pieces, being usually collected from older branches. That which is gathered very young, is scarcely distinguishable from the cinnamon of Ceylon. It is not recognized in our markets as a distinct variety.

“ The *Chinese cinnamon*, called *cassia* in commercial language, is in single tubes of various sizes, from an eighth of an inch to half an inch or even an inch in diameter. Sometimes the bark is rolled very much upon itself, sometimes is not even completely quilled, forming segments more or less exten-



sive of a hollow cylinder. It is of a redder or darker colour than the finest of the East India Company's cinnamon, thicker, rougher, denser, and breaks with a shorter fracture. It has a stronger, more pungent and mucilaginous, but less sweet and grateful taste ; and, though of a similar odour, is less agreeably fragrant. It is the kind almost universally kept in our shops, and while it is much cheaper than the former variety, is perhaps not inferior to it for the preparation of the various tinctures, &c., into which cinnamon enters as an ingredient. Of a similar character is the cinnamon imported directly from various parts of the East Indies. But under the name of cassia are also brought to us very inferior kinds of cinnamon, collected from the trunks or large branches of the trees, or injured by want of care in keeping, and perhaps some derived from distinct species of *Laurus*. It is said, that cinnamon from which the oil has been distilled, is sometimes fraudulently mingled with the genuine. These inferior kinds are detected, independently of their greater thickness and coarseness of fracture, by their deficiency in the peculiar sensible properties of the spice.

“We have treated of cinnamon and cassia under the same head ; because, even admitting the latter to be sometimes derived from the *Laurus Cassia*, we are absolutely certain that much of what is sold by that title is real cinnamon, and we are in possession of no grounds by which we can distinguish them. The only differences observable between the numerous varieties, are such as might readily arise from causes unconnected with difference of species ; and even the mucilaginous taste of cassia, is ascribed by Dr A. T. Thomson to the circumstance, that the larger branches being decorticated, and the cuticle only removed, the cellular integument is left, thick, spongy, and full of a slimy mucus. In fact, the very existence of the *Laurus Cassia* as a distinct species, is denied by some botanists, who consider it at most but a variety of the *L. Cinnamomum*.

“From the analysis made by Vauquelin, it appears, that

cinnamon contains a peculiar essential oil, tannin, mucilage, a colouring matter, an acid, and lignin. The oil obtained from the Cayenne cinnamon, he found to be more biting than that from the Ceylonese, and at the same time to be somewhat peppery. This aromatic yields its virtues wholly to alcohol, and less readily to water. At the temperature of boiling alcohol very little of the oil rises, and an extract prepared from the tincture retains therefore the aromatic properties."

Under the head *Hirudo Medicinalis*, p. 336, &c., we have the first authentic account of the American leech (*Hirudo decorata*, of Say) which has appeared in any medical work. The article on *Iodine* will be found by the physician to contain a condensed view of the medical uses of that important agent.

We extract the whole article on Rhatany, believing that this very useful astringent has not hitherto received that attention in this country, which a better acquaintance would have ensured for it.

"KRAMERIA. *U. S. Rhatany.* 'Krameria triandra. Radix. *The root.*' *U. S.*

"*Off. Syn.* KRAMERIE RADIX. Krameria triandra. Radix. *Lond.* ; KRAMERIA TRIANDRA. Radix et Extractum. *Dub.*

"*Ratanhie, Fr.* ; *Ratanhiawurzel, Germ.* ; *Ratania, Ital.*, *Span.*

"KRAMERIA. *Class* Tetrandria. *Order* Monogynia.—*Nat. Ord.* Polygalæ, *Juss.*

"*Gen. Ch.* *Calyx* none. *Corolla* 4-petalled ; the superior nectary 3-parted, and inferior 2-leaved. *Berry* dry, echinated, 1-seeded. *Willd.*

"*Krameria triandra.* Ruiz and Pavon, *Flor. Peruv.* i. 61. The rhatany plant is a shrub having a long, much branched, and spreading root, of a blackish-red colour, with a round, procumbent, very dark coloured stem, divided into numerous branches, of which the younger are leafy and thickly covered with soft hairs, giving them a white silky appearance. The leaves are few, sessile, oblong-obovate, pointed, entire, pre-

senting on both surfaces the same silky whiteness with the young branches on the sides of which they are placed. The flowers are lake-coloured, and stand singly on short peduncles at the axils of the upper leaves. There are only three stamens. The nectary consists of four leaflets, of which the two upper are spatulate, the two lower roundish and much shorter : it does not correspond with the generic character of *Willdenow*, which was drawn from the *Krameria Ixina*. The fruit is globular, of the size of a pea, surrounded by stiff reddish-brown prickles, and furnished with one or two seeds.

“ This species of *Krameria* is a native of Peru, growing in dry argillaceous and sandy places, and abundant about the city of Huanuco. It flowers at all seasons, but is in the height of its bloom in October and November. The root is dug up after the rains.

“ The *K. Ixina*, growing in Hayti, and in Cumana on the South American continent, is said to afford a root closely analogous in appearance and properties to that of the Peruvian species ; but the latter only is officinal.

“ The name *rhatany* is said to express, in the language of the Peruvian Indians, the creeping character of the plant.

“ We receive *rhatany* in pieces of various shapes and dimensions, some being simple, some more or less branched, the largest as much as an inch in thickness, being derived from the main body of the root, the smallest not thicker than a small quill, consisting of the minute ramifications. They are composed of a dark reddish-brown, slightly fibrous, easily separable bark, and a central woody portion less coloured, but still reddish, or reddish-yellow. The root is without smell, but has a bitter, very astringent, slightly sweetish taste, which is connected with its medical virtues, and is much stronger in the cortical than the ligneous part. The smallest pieces are therefore preferable, as they contain the largest proportion of the bark. The powder is of a reddish colour. The virtues of the root are extracted by boiling water, which forms a dark brown infusion. By digestion in alcohol a deep reddish-brown



tincture is obtained, from which a pink-coloured precipitate separates upon the addition of water. Vogel obtained from 100 parts of the root 40 parts of a red astringent matter which he considered a modification of tannin, 48 of lignin, and minute quantities of gum, starch, and gallic acid. But it is obvious that these proportions must vary according to the relative quantity of cortical and ligneous matter. M. Peschier of Geneva announced the discovery of a peculiar acid in rhatany, which he called *krameric*; but M. Chevallier was unable to procure it by a repetition of the process. The mineral acids and most of the metallic salts throw down precipitates with the infusion, decoction, and tincture; and are incompatible in prescription.

“By evaporating the decoction an extract is obtained, which when dried has a reddish-brown colour, a vitreous and shining fracture, and yields a blood-red powder. It has the bitterness and astringency of the root, and bears a close resemblance to kino. The extract imported from South America is much inferior to that prepared in our shops.

“*Medical Properties and Uses.*—Rhatany is gently tonic and powerfully astringent; and may be advantageously given in chronic diarrhœa, passive hemorrhages, some forms of leucorrhœa, and in all those cases in which kino and catechu are beneficial. It has long been used in Peru as a remedy in bowel complaints, as a corroborant in cases of enfeebled stomach, and as a local application to spongy gums. Ruiz, one of the authors of the Peruvian Flora, first made it known in Europe. It has but recently been introduced into this country, where it is acquiring increased reputation. It has the advantage over the astringent extracts imported, that being brought in the state of the root, it is free from adulteration, and may be prescribed with confidence.

“The dose of the powder is from twenty to thirty grains; but in this form the root is little used. The decoction is more convenient, and is usually preferred. It may be prepared by boiling an ounce of the bruised root in a pint of water, and



taken in the dose of one or two fluid ounces. The extract, when carefully made, is perhaps preferable to any other form, as it is of uniform strength. The dose is ten or fifteen grains. A tincture may be prepared by macerating three ounces of the bruised or powdered root in a pint of diluted alcohol for two weeks. Half an ounce of cinnamon or an ounce of orange-peel may be added to the other ingredients, to improve the flavour, and render the tincture more pleasant to the stomach. The dose is one or two fluidrachms."

A few pages of observations on the general properties of the fixed and volatile oils, will be found useful by the student of pharmacy. We observe that the palm oil is attributed to the *Elais Guiniensis*, a native of the western coast of Africa, instead of the *Cocos butyracea*, to which it is ascribed by the Edinburgh College. The following account of the manufacture of Castor Oil in the United States, we doubt not will be interesting to our readers:

"This species of *Ricinus* is a native of the East Indies and Northern Africa; has become naturalized in the West Indies; and is cultivated in various parts of the world, in no country perhaps more largely than in the United States. New Jersey, Virginia, North Carolina, and the states upon the right bank of the Ohio, are the sections in which it is most abundant. The flowers appear in July, and the seed ripens successively in August and September. The part employed in medicine is the fixed oil extracted from the seeds; and as this is always purchased by the apothecary, it has been very correctly placed in the United States Pharmacopœia among the original articles of the *Materia Medica*.

"The oil may be extracted from the seeds in three ways, 1, by decoction; 2, by expression; and 3, by the agency of alcohol.

"The process by decoction, which is practised in the East and West Indies, consists in bruising the seeds, previously deprived of their husk, and then boiling them in water. The oil rising to the surface is skimmed or strained off, and after-

wards again boiled with a small quantity of water to dissipate the acrid principle. To increase the product it is said that the seeds are sometimes roasted. The oil is thus rendered brownish and acrid ; and the same result takes place in the second boiling, if care is not taken to suspend the process soon after the water has been evaporated. Hence it happens that the West India oil has generally a brownish colour, an acrid taste, and irritating properties.

“ The mode by expression is directed by the London College, which simply orders the seeds, previously decorticated, to be bruised, and the oil expressed without heat. But these directions are both redundant and deficient. The removal of the outer covering of the seeds is unnecessary, as it contains no injurious principle ; and something more than simple expression is requisite to obtain the oil in a state fit to be kept in the shops. The following, as we have been informed, are the outlines of the process usually employed by those who prepare the oil on a large scale in this country. The seeds having been thoroughly cleansed from the dust and fragments of the capsules with which they are mixed, are conveyed into a shallow iron reservoir, where they are submitted to a gentle heat, insufficient to scorch or decompose them, and not greater than can be readily borne by the hand. The object of this step is to render the oil sufficiently liquid for easy expression. The seeds are then introduced into a powerful screw-press. A whitish oily liquid is thus obtained, which is transferred to clean iron boilers, supplied with a considerable quantity of water. The mixture is boiled for some time, and, the impurities being skimmed off as they rise to the surface, a clear oil is at length left upon the top of the water, the mucilage and starch having been dissolved by this liquid, and the albumen coagulated by the heat. The latter ingredient forms a whitish layer between the oil and the water. The clear oil is now carefully removed ; and the process is completed by boiling it with a minute proportion of water, and continuing the application of heat till aqueous vapour ceases to rise, and till a small por-

tion of the liquid, taken out in a vial, preserves a perfect transparency when it cools. The effect of this last operation is to clarify the oil, and to render it less irritating by driving off the acrid volatile matter. But much care is requisite not to push the heat too far, as the oil then acquires a brownish hue, and an acrid, peppery taste, similar to those of the West India medicine. After the completion of the process the oil is put into barrels, and thus sent into the market. One bushel of good seeds yields five or six quarts, or about twenty-five per cent of the best oil. If not very carefully prepared, it is apt to deposit a sediment upon standing; and the apothecary frequently finds it necessary to filter it through paper before dispensing it. Perhaps this may be owing to the plan adopted by some, of purifying the oil after expression, by merely allowing it to stand for some time, and then drawing off the supernatant liquid. We have been told that the oil in barrels occasionally deposits a copious whitish sediment in cold weather, which it redissolves when the temperature rises. This substance is probably stearin, or an analogous principle. A large proportion of the drug consumed in the eastern section of the Union, is derived by way of New Orleans from Illinois and the neighbouring states, where it is so abundant that it is sometimes used for burning in lamps."

The article on *Opium*, as might be expected, from the great importance of the subject, and the increased attention which has been of late bestowed on it by chemists, is very copious. We think, however, that without some explanation the reader will be apt to be misled, as to the proportion of morphia to be obtained, by the following sentence (p. 466): "Good opium should yield ten or twelve per cent of the *impure morphia*, precipitated from the infusion by ammonia with alcohol, according to the process of the United States Pharmacopœia." The fact appears to us to be, from frequently repeated trials on a large scale, that a considerable proportion of this "impure morphia" is narcotin. There is, perhaps, half as much narcotin precipitated by the ammonia as there is of morphia, but

so blended with the latter and with colouring matter, as not to be obvious in this stage of the process. The average produce of an avoirdupois pound of good opium, we have found to be one ounce and a third of pure morphia, which is equal to eight and a third per cent.

We think there is a slight error on p. 477, under the head "*Panax quinquefolium*." The initials "U. S." are given as denoting its having obtained a place in the Pharmacopœia of this country; yet three lines below, we are told that "*ginseng*" is "not included in any of the Pharmacopœias." The care, however, and research with which this work has been prepared, may be seen to advantage in the department more strictly chemical, as well as in those devoted chiefly to the elucidation of what are generally, in contradistinction, termed drugs. As an instance, we may refer the reader to the accounts of the several commercial salts of lead, potass and soda, from which much useful practical information may be obtained.

We should be happy to give our readers the whole of the interesting articles on *Rhubarb*, *Sarsaparilla* and *Senna*, were the insertion of them compatible with our prescribed limits, and did we not hope that but few of our subscribers will deny themselves the pleasure of their perusal in the work itself.

Under the head *Vinum*, which is well, though concisely treated, we have a useful table, originally published by Brande, of the proportion of alcohol in different varieties of wine, a subject of importance to the physician, more than to the pharmacist.

We beg to dissent from the practice of the Dispensatory and National Pharmacopœia in spelling *Xanthorrhiza* with a single *r*, believing it to be contrary to the analogy of the Greek language, from which the name is taken.

The last article in this division of the work is on the subject of ginger, and very properly advocates the superiority of the Jamaica variety of that valuable spice.

The second part of the work, viz. the Preparations, on which we now enter, will require only a short notice. It appears to



have been prepared with the same scrupulous regard to accuracy, and the same extensive research and practical knowledge of the subject as characterize the former part. It contains all the formulæ of the three British Colleges, as well as those of the Pharmacopœia of the United States, with copious annotations, for the information at once of the physician and the manipulator. This department of the Dispensatory is preceded by a chapter of general and miscellaneous directions for the various operations in pharmacy, which, we doubt not, will be found highly useful in the laboratory. They are evidently the result of individual practice and experience. The descriptions of apparatus are illustrated by wood-cuts, some of which appear to be new, and well adapted to facilitate the business of the apothecary.

This latter part of the work is necessarily of so miscellaneous a nature, that it is out of our power to do more than point out to the reader for his special attention some of the prominent articles, which have struck us as particularly valuable. Such are the treatises under the respective heads of Nitric and Sulphuric Ethers, Tartar Emetic, Ceratum Cantharidis, Emplastrum Plumbi; the general remarks on the preparation of Extracts, the articles on Corrosive Sublimate, and Calomel, Morphia, Potassa, and its Carbonate, Sulphate of Quinia, Bicarbonate of Soda, and the general remarks on Syrups. We may be indulged in a few observations with respect to the remarks on the preparation of morphia and its officinal salts. Speaking of the narcotin, which is almost invariably obtained in company with the morphia, the authors remark, that "the simplest and easiest method of separating it is to submit the mixture to the action of sulphuric ether, which dissolves the narcotin, and leaves the morphia." This use of ether is extravagant, and we cannot think it necessary, except when the morphia is to be used, or sold, not in combination with an acid, which is extremely seldom. In making the salts, the narcotin may very readily be got rid of by a little care in the manipulation. In the instance of the acetate, if the *Acidum aceticum*

*dilutum* of the Pharmacopœia of the United States is employed without any additional water, and the solution made in a water bath, the narcotin remains undissolved, and may be separated pretty pure from the solution of acetate of morphia by filtration. And in preparing the sulphate, as narcotin is dissolved by diluted sulphuric acid, but does not crystallize in combination with it, most of the sulphate of narcotin (if the combination may be so styled), remains behind in the mother liquors; and the small portion which may possibly be mixed with the crystals of sulphate of morphia, may be separated by a second crystallization.

In conclusion we may observe, that in noticing this work, we are conscious of no motive but the advancement of accurate scientific knowledge; and we are anxious that its merits should be generally and at once known to our readers, from a confidence that the expectations of the public will not be disappointed. We recommend it most cordially to the medical fraternity, to the practical pharmacist, and especially to the diligent perusal of the student of medicine or pharmacy. The critical eye of experience may hereafter find errors, and the advance of knowledge will throw light on topics now obscure or imperfectly known; and we shall scarcely claim for the pages before us that praise which we believe was justly bestowed on the recent Pharmacopœia of the United States, of an almost immaculate letter-press. But we cannot refrain from expressing our firm conviction, that, as a whole, this Dispensatory is the best work in the English language, on the subjects of which it treats; and we know of no work so well calculated, in the eyes of our neighbours of Europe, to raise the character of American science.

## SELECTED ARTICLES.

ARTICLE XLIX.—*New Experiments on Mustard Seed.*  
*By MM. Robiquet and Boutron Charlard.*

[Extract. Translated from the French by T. H. Powers.]

THE interesting researches of MM. Henry, Jun. and Garot, on white mustard seed, the remarks on them by M. Pelouze, and the reply to these by the experimenters, are of too recent occurrence to be forgotten. In fact it is universally known, that MM. Henry and Garot first discovered a crystalline substance in this seed, which appeared to possess an acid character, and of which, also, sulphur appeared to be one of the constituents, thus resembling the sulpho-cyanic acid in some particulars, but differing from it in many others. The young chemists bestowed the name of Sulpho-sinapic acid on their new substance, to designate both its nature and origin.

More recently, M. Pelouze having remarked some discrepancies between the capacity of saturation of this acid, as deduced from calculation, and those afforded by actual experiments, and having also observed, that in regard to different bases, the quantities necessary for the saturation of the same weight of acid were not in accordance with their atomic weights, thought that it was necessarily owing either to an error as to the acid nature of this substance; or, that its combinations had not been clearly understood.

Desirous of ascertaining which of these conjectures was well

founded, M. Pelouze undertook some experiments, which led him to conclude that the acidity of the products of white mustard seed was owing to the presence of malic acid, which is present in the state of acid malate of lime; and to sulpho-cyanic acid, which is a primary constituent in the state of sulpho-cyanogen, combined with calcium. It is to the presence of a certain quantity of this last acid in the *sulpho-sinapisine* of MM. Henry and Garot, that M. Pelouze attributes the acid nature of this substance, and the property it possesses of striking a red colour with the per-salts of iron; so that according to M. Pelouze, *sulpho-synapisine* cannot be an acid, nor contain any sulphur in its composition.

These results, announced in a very positive manner, determined MM. Henry and Garot to immediately repeat their experiments, which afforded the following results:

1. That there exists, in white mustard seed, a particular crystalline substance (*sulpho-synapisine*), formed by the elements of sulpho-cyanogen, and of an organic base, suitable for developing the volatile oil of mustard.

2. That this substance, mistaken in 1825 for an acid, is neutral, but capable, under the influence of certain acids, oxides and salts, of transforming itself wholly or partially into sulpho-cyanic acid, either free or combined, and into volatile oil of mustard.

3. That there does not exist any sulpho-cyanuret of lime in mustard seeds, as had been asserted by M. Pelouze, and that the sulpho-cyanic acid which he found in the products of the distillation with sulphuric acid, resulted from the action of the acid on the *sulpho-sinapisine* itself, and not from the decomposition of sulpho-cyanuret of lime, since it does not exist in them.

It is evident, that with every new research, science makes some progress, and that no one need flatter himself with having said all, for, with whatever patience an experimenter may be endowed, it is impossible for him to embrace the numerous details of so complex a subject. Pre-occupied in general by



some predominant idea, which renders him incapable of seizing such phenomena as present themselves confusedly, he only observes such as are in accordance with his own views. The utility of these re-examinations, and of changing the nature of the experiments is, that each becomes provided with new weapons, and gains by that means. As to ourselves, our preceding observations on the bitter almonds, led us to the present research, and we were anxious to make a comparative study of these two seeds. We wished, for example, to ascertain whether water is not an indispensable vehicle in the development of certain principles in both these seeds. We therefore first subjected the white mustard seed to the same treatment as the almonds ; that is, water was not employed until after we had extracted all that alcohol or ether would take up. Accordingly, we took some powdered white mustard seed, from which the greater part of the fixed oil had been drawn by expression, and introduced it into a long, thick tube, drawn out at one end and closed with a glass stopper at the other. The tube was then filled with ether, and immediately closed. The apparatus was disposed in such a manner, that the ether could only run out very slowly. This menstruum acted on the oil with a sort of repulsive force ; it chased the oil as it were before it, and that which ran off at first was oil nearly pure, and scarcely smelling of ether. The washing was continued until the liquid, which was mostly of a fine yellow colour, came off nearly colourless. The ethereal solutions were mixed in a retort, and distilled from a water-bath ; the oil obtained from the residue of this evaporation was found, to our great astonishment, to have a marked acidity. We say to our great astonishment, because the first portions of oil that run off had a very sweet taste. We noted this observation, to avail ourselves of it in another experiment, and continued the present as follows : we submitted on the one hand the residue exhausted by ether to a new washing with cold alcohol, and on the other, we tried to take up with cold alcohol the acrid principle contained in the oil extracted by ether.

A few hours were sufficient to obtain the products of this last experiment. The oil and alcohol were poured into a stoppered bottle, shaken for some moments, left to rest, the floating alcohol then poured off, and replaced by another portion; this operation was continued until the alcohol came off tasteless. The oil which remained, being deprived of the alcohol, by evaporation, with which it was impregnated, was altogether insipid. The first washings were of a greenish yellow colour; they strongly reddened litmus, and had an acrid and sharp taste, resembling that of horse-radish. All the alcohol was united and submitted to a slow evaporation, in a close apparatus. The residue was decanted into a long tube, that it might deposit some small drops of oil, which were separated by means of the evaporation.

The upper liquid was of a brownish, somewhat deep green colour; of a hepatic, but not pungent odour, and tasted like that of the first alcoholic washings. It is remarkable, that it possessed in a high degree the property considered as one of the strongest characteristics of *sulpho-sinapisine*, viz. that of striking a red colour with solutions of the per-salts of iron.

The alcoholic product furnished nothing of a like nature. After some days of rest, we discovered in it long, flat, needle-shaped and pearly crystals, which presented all the characters of one of the substances described in the first memoir of MM. Henry and Garot.

A small portion of this acrid tincture was evaporated in the open air, and an oily matter separated from it; but we did not remark any trace of crystals. Another more considerable portion was submitted to distillation, after having been supersaturated with potass in a very slight excess; the product of the distillation was neutral, inodorous, and did not exercise any influence on the solutions of the per-salts of iron, whilst the residue acquired this property in a manner more and more marked, as the evaporation advanced. We supersaturated the residue with nitric acid, evaporated it in a platina crucible,

and afterwards calcined it strongly. The product of the calcination was redissolved in distilled water, and being suitably essayed with salt of baryta, gave a great quantity of sulphate.

The distillation with alkali was undertaken in the hope of volatalizing its acrid principle, as in the case of tobacco. We thought we remarked, that a superabundance of potass added to this product, developed an odour of mustard; but this was probably owing to the excess of potass having reacted on the organic matter, and produced a small quantity of ammonia, which had served as a vehicle for the odour.

Presuming, from the observations of our predecessors, that the property of turning red with solutions of the per-salts of iron, was due to the hydro-sulpho-cyanic acid, we readily accounted for the effect produced by the potass, but we thought that ammonia, instead of retaining it like the potass, would facilitate its volatilization, and that it would contribute perhaps as well to a development of sinapic odour. In consequence, we distilled a mixture of ammonia and acrid tincture, but only obtained a liquid of a fresh ammoniacal odour, which, when saturated with nitric acid, did not turn in the least red with the per-salts of iron, whilst the residue in the retort preserved that property in a high degree.

If the sulpho-cyanic acid exists in this product, it must be in combination. In order to ascertain this point, we added some drops of sulphuric acid to a little of the acrid tincture; the mixture, when distilled, gave a product which strongly reddened with the per-salts of iron, but had not the peculiar sharp odour of sulpho-cyanic acid. This may have proceeded from our liquid having been too dilute, for it is difficult, after the researches of MM. Henry and Garot, and those of M. Pelouze, to doubt the existence of this acid in the products of mustard. Nevertheless, we may remark, that this last chemist may have been mistaken as to the odour of the product which he has obtained; in fact, M. Pelouze says, that after having precipitated a decoction of mustard seed with the acetate of lead, and treated the supernatant liquor with sulphuretted hy-

drogen, to remove the excess of lead, he afterwards added sulphuric acid to the liquor, and submitted the mixture to distillation. The product was a fluid of a sharp odour, approaching very near to that of acetic acid, and which possessed, besides, all the properties of the sulphuretted chysic acid of Porsett. It is certain that in this case the acetic acid was derived from the acetate of lead, and was due to the mixture of the product, and that the sharp odour observed by M. Pelouze might easily be derived from it.

To assure ourselves if the sulpho-cyanic acid in our acrid tincture was combined with any inorganic base, we evaporated to dryness and calcined a certain portion of it, which did not leave any appreciable residue.

It is evident, then, from the preceding, that if the sulpho-cyanic acid exists in the acrid tincture, it must be in combination, if not with a base, at least with some organic product.

This first treatment by ether made known to us the presence of an acrid, fixed substance in the white mustard, which has not heretofore been mentioned. But it is not to be presumed that we have yet obtained it in its purest state. The alcohol which we were obliged to make use of to extract it, dissolved at the same time some fat oil, and it is very probable that this principle retained a little of it.

In hopes of obtaining it more pure, we had recourse to another mode of extraction, profiting by our observations on the successive action of ether. Accordingly, a new portion of the mass was treated with perfectly neutral ether, and we each morning removed from the apparatus the liquid which had run from it during the twenty-four hours, and distilled a part of it. We thus obtained a series of products, of which the acidity was constantly increasing, and which each time contained proportionably less of fat oil. But unfortunately the absolute quantity diminished more and more.

The first tinctures, which contained a great deal of fat oil, were of a fine citron yellow colour; the last were of a greenish-yellow, nearly colourless.



The product of the evaporation of one of the last washings, the taste of which was caustically acrid, being redissolved in a small quantity of water, the mixture became milky : we submitted it to distillation, and after some minutes' boiling, tested with a per-salt of iron, by which neither the distilled product, which was inodorous, nor the aqueous residue, were in the least changed. The liquid was again carried to ebullition, which was continued for more than half an hour. The same tests were repeated, and the results were very nearly the same, although a slight tinge of red was observable in each of the two products.

This acrid substance, which had thus undergone a prolonged ebullition, was separated into two products, one yellow and fluid, which preserved much acrimony, the other brown and solid, not having any taste : both were inodorous, and yet the last developed a slight smell of hartshorn when rubbed between the fingers.

This mode of extraction is long and expensive, and we obtain, too, but a small quantity of the product ; hence the difficulty of examining this new substance in its pure state. Still we think that the best means of obtaining it, would be to treat several times by alcohol the product of the evaporation of the last ethereal tinctures. At each operation we would remove a small portion of the sweet oil, and would succeed without doubt in disengaging it altogether from the acrid principle. What seems to authorise us in this conclusion, is that the solubility of the product which we have obtained, was augmented by each new treatment, and also that we separated less oil from it by each successive one. We have always procured this acrid principle in the state of an unctuous red liquid, soluble in alcohol and ether, inodorous, and of a sharp taste, resembling that of horse-radish. It remains to be known whether it really pre-exists in white mustard seed.

The following experiments will throw some light on that question.

Some will, without doubt, have remarked, that in the first

treatment, the acrid principle separated from the fat oil extracted by ether, possessed the property of reddening strongly by the per-salts of iron, and which did not take place with the same acrid principle obtained directly from the etherial washing of the second mode of treatment.

To what are we to attribute this difference? It will be perhaps difficult for us to give at this time a very plausible explanation ; nevertheless, we shall say that if this property of turning red with the per-salt of iron is characteristic of sinapisine, as MM. Henry and Garot think, we should be able to find this new and curious substance in all the products of white mustard seed, which possess this property in a decided manner. But this is not the case ; for our first acrid tincture, which reddened strongly, afforded no trace of crystalline matter, when allowed to evaporate spontaneously. This character of sinapisine is therefore accidental, and depends on a foreign substance. MM. Henry and Garot have shown that sinapisine was susceptible, under certain influences, of giving rise to sulpho-cyanic acid ; and that acid has also for one of its characters, that of striking a red with the per-salts of iron. It may be presumed, then, that when sinapisine presents this property, the alteration has already commenced, and that to obtain it in its pure state, we must be able to preserve it from the influences which determine its decomposition.

Since our experiments on bitter almonds, we regarded water as the most efficient agent in modifying organic principles, and thought to prevent all alterations of this kind by the mode of treatment we then followed. We continued therefore to wash with alcohol the flour of mustard which had been drained from ether, and obtained a new series of tinctures or washings, the first of which was of a brownish red colour, though the last etherial washings had scarcely an amber tint ; the alcoholic tinctures were all united and distilled at a moderate heat ; the product of the distillation was pure alcohol, and the residue, which had acquired a reddish-brown colour, had become

slightly viscous, and had a distinct odour of yeast of beer. We poured it into a capsule, and after some hours cooling, it became solid by the crystallization of a substance, which assumed the form of small micaceous leaves. The whole was placed on a piece of cloth, and strongly pressed. The crystalline deposit was reduced to a very small volume, and was of a dull white. It was redissolved in boiling alcohol, in which it appeared to be quite soluble, and the liquid being set aside to cool, we saw it dispose itself into small white tufts of needle-shaped crystals, and the number of them increase to such a degree that the whole became a single mass. We threw them on a filter and washed them with a little cold alcohol.

This crystalline product, submitted to several essays, presented all the principal characters of sulpho-sinapisine, not excepting that of turning red with the per-salts of iron. Thus we might rest convinced that this last property was inherent to the sinapisine, were it not for the difference which we have remarked between the products of the first mode of treatment by ether, and those of the second. This anomaly, inexplicable as it was, determined us on making new efforts, as we had before intended, to obtain the sinapisine by other methods, and to see if, by varying the mode of treatment, we could not obtain it in another state. We attached the more importance to this research as we were very curious to ascertain whether sulphur was really one of the constituent parts of sinapisine, for it is, without doubt, one of the most singular and interesting results that organic analysis has afforded us for a long time. It was necessary then that it should be well proved. This time we treated the powdered mass directly with concentrated boiling alcohol, and thus obtained a tincture of a greenish-yellow, which became a little opaque by cooling, and struck a slight red colour with the per-salts of iron. Some hours afterwards, it was seen to deposit a crowd of yellowish-white radiated tufts on the sides of the vase. The next day they were separated from the liquid and washed with a little ether,

in order to separate the fatty matter with which they were impregnated.

One fact, which it is important to make known here, is, that after the first alcoholic treatment the powdered mustard had entirely lost its sharp taste, and what was more astonishing, neither the alcoholic solution, or the product of its evaporation, nor the crystals deposited, had any acrid taste. We shall return to this observation, which we think worthy of attention.

The crystals under consideration were redissolved in boiling alcohol, which did not act on them until after a continued ebullition, and required a much greater quantity of solvent than those obtained by treating with ether; we examined them, after having purified them, and found—

1. That when once dissolved in water they could not be reproduced by cooling, as the sinapisine of MM. Henry and Garot, and that by spontaneous evaporation there remained on the sides of the capsule a sort of varnish, of a transparent yellow, which detached itself in scales.

2. That they do not exercise any colouring influence on the per-salts of iron, but, like the sinapisine of MM. Henry and Garot, they give sulphuretted hydrogen when decomposed by heat, and sulphuric acid when treated by nitric acid. In fine, these crystals possess the other properties of ordinary sulpho-sinapisine; nevertheless, when treated by concentrated alkalies, they do not emit any of the sharp odour of mustard which MM. Henry and Garot have observed under the same circumstances, but only a very fresh odour of ammonia.

Thus we see that these two products, though very evidently the same, differ, notwithstanding, in some points. It was presumed that these differences must be owing to some change in their elementary composition. Ours, in fact, contains—

Carbon	54.000
Hydrogen	10.6512
Nitrogen	2.8392
Sulphur	9.3670
Oxygen	23.1426



That of MM. Henry and Garot is formed of

Carbon	57.920
Hydrogen	7.795
Nitrogen	4.940
Sulphur	9.657
Oxygen	19.688*

MM. Henry and Garot have remarked, that in their sinapisine, the nitrogen and sulphur are in very nearly the same proportions as in sulpho-cyanic acid. We see that in ours the quantity of nitrogen is too small. Could that be the property which would render the formation of sulpho-cyanic acid more difficult? We are ignorant of it, but it might be so, though this will not explain the variation in the composition of the matter itself. May not the nitrogen be accidental, and depend on some foreign matter? Perhaps future observations will prove this. In the mean time, what can we conclude from these singular anomalies if it is not that it is impossible to state any thing positively on the elementary composition of the products furnished to us by the analysis of organic substances, and that we cannot be certain of their existence until after having obtained the same by several different processes.

By comparing our results with those of MM. Henry and Garot, it may be seen that they agree in this point, viz. the property of turning red with the per-salts of iron does not prove the presence of sulpho-cyanuret of lime in the products which possess it, and that they differ in this, that the property is not, according to us, inherent to the sinapisine, nor do we think that it would be a consequence of its alteration. We would be more disposed to think with M. Pelouze, that it depends on the presence of a certain quantity of sulpho-cyanic acid, coming from an entirely different source. Still we must own that we have also some doubts as to this being the fact, since we have not been able in any case to develop the sharp odour which belongs to this acid.

\* Results corrected by M. Pelouze.

We will cite here a remark which we have made, and which will, without doubt, find its application hereafter. We know that in our first treatment of the white mustard seed by ether, all our products would turn red, and that in the second, this would not take place. We have said that we were ignorant of the cause of this difference, as we did not think of its depending on a few atoms of acid contained in the first ether. It is certain, however, that, struck with the decided acidity of our products, we have supposed that it might be derived from the ether itself, and it was principally to assure ourselves of it, that we repeated the experiments, but with neutral ether, and not only have our products been neutral in this case, but they have not manifested the property of reddening with the per-salt of iron. It seemed from this that it must have been the acidity of the ether which had favoured the development of the principle which possessed the property of turning red, and it is also perhaps for this reason, that in treating a portion of powdered white mustard seed directly by alcohol, the product did not turn red, whilst it is altogether different if we treat it directly by water, as then this menstruum dissolves the acid contained in the mustard seed, which acid, by its reaction on the powder, favours, without doubt, the solution of this principle. One may see how important it is to know what these conjectures are worth, and we have already undertaken some new researches on this subject.

MM. Henry and Garot have remarked, that the elements of sinapisine might be so grouped as to represent those of sulpho-cyanogen and an organic matter susceptible of transforming itself into an essential oil; nothing is more gratifying to the mind than these speculative combinations, and this is a pleasure that may be readily enjoyed; a stroke of the pen is sufficient. But between the likelihood and the truth, the distance is often very great, and it requires nothing less than the whole power of the imagination to overcome it; but it is what we like to rest some of our difficulties on, though we must own that the hypothesis of MM. Henry and Garot

appears to us devoid of it. It may be remarked, that if we represent the sinapisine as formed of sulpho-cyanogen and a sort of base of an essential oil, we cannot see, since the cyanogen takes all the sulphur, whence the oil draws that which enters into its composition, and it contains a great quantity. There is, besides, another observation to make, viz. that if the sinapisine contains, as MM. Henry and Garot think, the radical of an essential oil, it must follow that the species of mustard which contains the most sinapisine, should also furnish the most essential oil, but it is precisely the contrary.

Our young colleagues have announced that in treating the sinapisine by the caustic alkalies with heat, it developed a fragrant odour of mustard. This experiment did not succeed with our sinapisine, and the acrid principle which we obtained from the powdered white mustard seed is not volatile. We say still that this powder diluted with water does not acquire any strong odour, and that distillation does not develop any more of it. Likewise, that the black mustard seed contains but little sinapisine, and white mustard no essential oil, nor any thing which appears susceptible of producing it. We have made many different experiments on this point, and may regard the result as certain.

Desirous also of knowing under what influences the volatile oil of mustard formed itself, and the causes which favoured or opposed its development, we have made some experiments, which we ask leave to add here.

We at first sought to prove whether the intervention of water was indispensable, and to arrive at it we treated a certain quantity of the marc of black mustard with boiling alcohol; that is to say, the powder deprived of the greater part of its fixed oil by expression; and we have seen that, as with the white mustard, the acrid principle disappeared by this treatment, without our being able to find a trace of it. We obtained for product, by the evaporation of the alcohol, only a viscous matter, which was sweet and inodorous, joined to a little bitterness, and very nearly soluble in water. The mustard that

had undergone this treatment had lost all its taste, and did not acquire any strength when diluted with water. Thus the mustard seeds act as do those of bitter almonds under similar circumstances.

We all know the lively and penetrating odour which the black mustard manifests when mixed with water, and it has been thought for a long time that the addition of a little acetic acid to the mixture gave it still more taste, though this result has been contradicted more recently. On the other side, some say that it is the influence of very volatile substances, and particularly that of ammonia, which favours the development of certain odours.

We have submitted the mustard to these influences, in order to see if there would not result some means of favouring the extraction of the volatile oil. In consequence we have made several mixtures of equal quantities of the powder and water; but for the first of these mixtures we used pure water, in the second we put a little acetic acid, in the third sulphuric acid, and in the fourth we dissolved a small quantity of subcarbonate of potass. Some seconds were sufficient to develop in the two first a most penetrating odour, while the other two remained absolutely inodorous; however, the alkaline mixture, while still fresh, had a slight smell of clover, afterwards it contracted a most fetid hepatic odour.

This contrast, on the development of the odour, is so decided, that it is somewhat surprising. How it is, that we find the odour destroyed in the two last mixtures; nothing has yet explained to us. In continuing our researches, we shall, perhaps, be more fortunate. All that we can remark at present is, that it is not probably as an acid that the sulphuric opposed the development of the essential oil, since the acetic acid has a directly opposite action to it, which results without doubt from its greater expansibility. We thought at first that this destruction of the odour might depend on the obstacle presented by the affinity of the potassa and sulphuric acid for water, preventing the emanation of vapour; an indispensable vehicle for



odours. But by submitting similar mixtures to distillation, the results have been the same. It becomes then more probable that it is by forming some combinations, or by opposing the reunion of certain elements, that these two agents prevent the development of the odour.

Having only succeeded in finding means to retard the extraction of this volatile oil, we were obliged to have recourse to the ordinary method, and to limit ourselves to rendering the process more easy. The following is the plan we have followed :—We put into the body of an ordinary still, two kilogrammes of the pulverised mass, with five kilogrammes of luke warm water, closed the still immediately, and drew off the liquor by means of a moderate charcoal fire. We thus obtained nearly half a gros of the essential oil from a kilogramme of the mass.

The study of the properties of this essential oil has already been made the subject of an interesting memoir, for which we are indebted to one of our ancient colleagues, M. Thibierge. Nevertheless, we have submitted it to new tests, to see if it would present any analogy to the essential oil of bitter almonds, but we have found that it did not undergo any alteration by prolonged exposure to the air or in oxygen. Neither did it manifest at any time either an acid or an alkaline reaction; nor did the water which came over with it turn in the least red with the per-salts of iron.

We have not yet determined its boiling point.

This oil, put in contact with diluted sulphuric acid, and agitated for some moments in a tube, gave a lactescent liquid, from which the oil would separate but with difficulty.

A weak solution of caustic potass produced entirely a contrary effect; the oil united itself much more promptly than if it had been united with water only.

In the two last trials the oil preserved the whole strength of its odour, and this tends much to demonstrate the non-pre-existence of essential oil, for we see that these two agents, mixed directly with the powder of black mustard, oppose the

development of its odour. But if it was from their reaction on the essential oil, the same effect should be produced by mixing them together.

Concentrated nitric acid destroys the essential oil of mustard promptly, and with a strong disengagement of nitrous gas. The remaining liquid contains a great quantity of sulphuric acid.

This essence, agitated with water and a few globules of mercury, blackens at once, but preserves its lively and penetrating odour even after several days of contact. This mixture submitted to distillation, has reproduced the essential oil full as penetrating as before, which, treated by nitric acid, has likewise furnished much sulphuric acid.

This experiment was attempted with the idea that the mercury might perhaps separate the sulphur, especially if it was but accidental.

We have not had time to carry our researches further, but it is our intention to continue them, and to endeavour to determine in what state the sulphur is contained in this essence, and whether it does not constitute a species of hydro-sulphuret of carbon. It will be curious also to *examine* whether nitrogen is an essential part of it.

This last analysis has shown:

1. That the chemical composition of the white and black mustard seed is essentially different.

2. That the active principle of the white mustard seed resides in a fixed substance, which does not pre-exist in the seeds, and which is most likely derived from the sinapisine combined with some other product, for if this principle is once taken up, the acidity does not again show itself. Both contain sulphur, and very nearly in the same state.

3. That the active principle of black mustard seed is a volatile oil which does not pre-exist, and which is not developed without the aid of water.

4. That from all these circumstances, we are induced to think that there exists in these seeds a principle from which is

derived the sulphur contained in the volatile oil; this principle should be found in the alcoholic treatment, and we propose searching there for it.

5. That the sinapisine extracted by alcohol, without the previous intervention of water, does not possess the property of turning red with the per-salts of iron, nor of developing any odour with the caustic alkalies; that it is less soluble in alcohol, and contains less nitrogen than that obtained by the process of MM. Henry and Garot, but that sulphur is one of its principal elements, and that from this circumstance, it is certainly one of the most interesting substances of the organic kingdom.

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ARTICLE L.—*On the Chloride of Iodine and its application to the preparation of a pure Iodic Acid.* By M. J. Liebig.

As iodic acid furnishes an important reagent in the verification of several vegetable bases, and as from trials made by myself, it is proved that the iodate of soda may be employed as a very good means of separating baryta from strontia, I have made repeated investigations on the preparation of these two compounds, with a view of discovering the best method of forming them, and I now present my observations on this subject, comparing them also with those of M. Serullas, as detailed in the *Annales de Chimie*.

There are, as is well known, two combinations of chlorine with iodine; one is brown and liquid, the other yellow and solid. This latter is only the liquid combination saturated with chlorine. Consequently, the former contains less chlorine; hence, it has been termed a chloride of iodine at the minimum

of chlorine; the other is designated as the chloride of iodine at the maximum. As this latter is soluble in water, the preparation of it is much facilitated by the following procedure:—On the iodine of commerce is to be poured from eight to ten times its weight of water; a current of chlorine is passed into this mixture until the whole of the iodine is dissolved, and absorbs no more of the gas. A yellowish brown fluid is thus obtained, which may be considered as a solution of hydrochloric and iodic acids, since the chloride of iodine is decomposed by water, and the chlorine combines with the hydrogen, and the iodine with the oxygen of this fluid.

We shall therefore in future consider the chloride of iodine in solution in water, as representing a mixture of hydrochloric and iodic acids. It now remains to prove by rigorous experiments, that iodic acid contains five atoms of oxygen. But, if by contact with water, the chloride of iodine is transformed into iodic and hydrochloric acids, it must be concluded that the chloride of iodine at a maximum contains five atoms of chlorine to one of iodine. This composition has generally been adopted since the recent experiments of Gay Lussac. But some experiments which I made, did not, by any means, give me this composition, and in fact, if it be true that the chloride of iodine at a maximum, is transformed by contact with water into hydrochloric and iodic acids, we should only obtain by saturating the watery solution by carbonate of potassa or soda, either chloride of potassium or the iodate of potassa or of soda. But it is remarked, that whenever this acid liquid is neutralised by one of these bases, that it is disposed to part with a notable portion of iodine, in the form of a blackish-brown or black powder. This fact evidently proves that in the solid chloride of iodine, there is more iodine than is requisite to form iodic acid.

I passed dry chlorine for a whole day through iodine equally dried, and was never able to obtain a combination which would remain perfectly clear when dissolved in water and saturated with potassa or soda; a large proportion of iodine always sepa-



rated from it. From the experiments it appears that the solid chloride of iodine must contain at least five atoms of chlorine, or in other words, it contains more iodine than is requisite to form iodic acid with the oxygen of the water which is set at liberty, when the chlorine combines with the hydrogen. Hence we may consider the solution of chloride of iodine in water as a mixture of the hydrochloric and iodic acids and iodine, or rather, of hydrochloric acid with an oxide as yet unknown, and of an iodous acid which is decomposed by the action of alkalies into iodine and iodic acid.

M. Serullas has discovered a very remarkable property in the chloride of iodine at a maximum; this is, that concentrated sulphuric acid precipitates it from its solution in the form of caseous flakes; but as we have seen above that the chloride of iodine is decomposed by water, it must here result, that under the influence of the sulphuric acid, the oxygen of the iodic acid combines with the hydrogen of the hydrochloric acid to again form water.

The chloride of iodine at a maximum possesses another interesting property; this is, that when moistened with water and afterwards sprinkled with alcohol, it is immediately decomposed, forming iodic and hydro-chloric acids. As the iodic acid is not soluble in alcohol, it separates in the form of a brown mass, whilst the supernatant alcohol holds the hydro-chloric acid and iodine in solution; by repeated washings with alcohol, the iodic acid can be obtained in a dry form in white crystalline grains. M. Serullas proposes this plan for the preparation of iodic acid on account of its simplicity, but it gives less advantageous results than any of the others. We scarcely obtain a seventh of iodic acid for the iodine employed, consequently there is a loss of six-sevenths of iodine, besides the expense of the alcohol.

*Iodate of Potassa.* When a solution of chloride of iodine at a maximum is not fully saturated with carbonate of potassa, so that the fluid still remains acid, on cooling, there is a precipitation of a combination of chloride of potassium and acid

iodate of potassa, in the form of a crystalline white powder. This double salt, whose composition does not appear to be sufficiently determined, contains about twenty-two per cent of chloride of potassium, the rest is acid iodate of potassa, which is readily separated from the chloride of potassium, by pouring warm water on the double salt, and slowly evaporating the solution.

In twenty-four hours the acid iodate of potassa crystallizes in a pure state in the form of regular rhomboidal prisms with dihedral summits. One part of this salt is soluble in seventy-five parts of water at 60° F. With the neutral iodate of potassa, we can obtain a tri-iodate of potassa, by dissolving it in an excess of diluted sulphuric acid, and permitting the solution to cool slowly. This salt crystallizes in rhombs, and is much more soluble than the bi-iodate, for one part will dissolve in twenty-five parts of water. The bi-iodate forms, with an acid sulphate of the same base, a peculiar double salt, which may be obtained in a crystalline form by slowly evaporating the mother-waters of the preceding.

*Iodate of Soda.* M. Serullas obtained this salt in the form of a white precipitate, by imperfectly saturating a solution of chloride of iodine at a maximum with soda, and then adding alcohol to the liquid, washing the deposit with spirits of wine, then dissolving it in warm water; the neutral iodate of soda crystallizes in the form of large, transparent, octahedral prisms. If this plan be followed in the preparation of this salt, there will be a loss of about a third of the iodine, which remains in solution in the alcoholic liquor. The following affords a quantity of iodate of soda, corresponding exactly to the iodine employed.

A current of chlorine is to be passed through water holding iodine in suspension, until this fluid no longer absorbs any of the gas. A solution of carbonate of soda is then to be added. As soon as the liquid approaches saturation, a notable quantity of iodine is precipitated. A current of chlorine is again passed through the mixture until it becomes transparent, and after-

wards soda is to be added till perfect neutralization is produced. It is evident that the treatment with chlorine must be continued as long as any iodine separates. The liquid is to be evaporated about a tenth; whilst it is still warm, half its volume of alcohol is to be added, and it is then to be permitted to cool. The iodate of soda then crystallizes in the form of a saline mass, composed of octahedral prisms grouped in a stellated form, which are to be washed with a little spirit of wine to remove any hydrochlorate of soda which may be mixed with them.

If alcohol be added to the evaporated and cooled liquid, it changes it almost entirely into a mass of the consistence of pap, which renders the washings with spirit of wine both difficult and expensive. I have already mentioned that the iodate of soda offers an excellent method of separating baryta from strontia, solutions of the salts of strontia not being precipitated by the iodate of soda; whilst, on the contrary, this salt throws down a white flocculent deposit from those of the neutral salts of baryta; and this precipitation is so complete, that not a particle of baryta remains in solution.

*Preparation of Iodic Acid.* M. Serullas has indicated several methods for the preparation of this acid; it may be obtained by decomposing the iodate of soda by silico-fluoric acid, boiling till all the excess of acid is volatilized, and then filtering. The filtered fluid is then mixed with a certain quantity of pure fluoric acid, and the white precipitate, which again forms, is to be separated by the filter. The liquid is then evaporated to the consistence of a thin syrup, and left to spontaneous crystallization in a warm situation; in this operation the glass vessels used should be covered with a layer of wax, to protect them from the action of the fluoric acid.

Iodic acid may be procured by another mode. To a boiling solution of iodate of soda, is to be added at least double the quantity of sulphuric acid necessary to saturate the soda contained in the salt, and the whole slowly evaporated on a moderately warm sand bath; a crystalline mass will be obtained, which is to be washed with very little water, and dried between folds of blotting-paper.

I have obtained very regular crystals by dissolving, by heat, one part of iodate of soda in one part of sulphuric acid, previously diluted with its weight of water, and evaporating the solution on a sand bath. The crystals presented a very singular property: when placed on folds of blotting paper, just as they appeared to have become dry, they suddenly became fluid, and changed into a transparent mass, which was almost wholly absorbed by the paper. When put into a porcelain capsule they also became liquid on exposure to the air, but after a certain lapse of time the whole changed into a white but uncrySTALLISED mass. It is very likely the crystals of iodic acid obtained by means of the sulphuric acid, are anhydrous, and become fluid by attracting moisture from the air, and again become solid after having absorbed the requisite quantity of water.

I have found the following procedure of my own to be at once simple and advantageous in its results. By the above indicated method, a solution of chloride of iodine at the maximum, saturated with chlorine, is to be formed, the solution is to be neutralised by carbonate of soda, using the precautions already stated when speaking of the iodate of soda; a solution of hydrochlorate of baryta is then to be added, till a precipitate no longer takes place. This precipitate is iodate of baryta, which is to be well washed with water on a filter and then dried. To nine parts of the dry precipitate is to be added two parts of sulphuric acid diluted with ten or twelve times its weight of water. This mixture is to be boiled for half an hour, and the sulphate of barytes separated from the diluted iodic acid by filtration; this latter is then to be evaporated to a slight syrupy consistence, and exposed to the air for a few days, when very regular and transparent crystals will form; the mother-water is to be decanted, and its spontaneous evaporation will afford another crop of crystals.

If we attempt to obtain the crystals by evaporating the iodic acid by aid of heat, a white mass will be the result, having no crystalline appearance. If the concentration be carried too



far, the residue will also be a white mass, which must be redissolved in a small quantity of water, and left to spontaneous evaporation, to give regular crystals.

If nitric or sulphuric acid be added to an aqueous solution of iodic acid, a crystalline white powder is precipitated, which has been regarded as a combination of these acids with iodic acid; but M. Serullas has found that this precipitate is pure iodic acid, which contains neither of the first mentioned acids in chemical combination. This precipitation of iodic acid is owing to its insolubility in nitric and sulphuric acid, as well as from these acids depriving it of its water of crystallization. I have also convinced myself by actual experiment of the non-existence of the pretended iodo-sulphuric and iodo-nitric acids.

*Journal de Pharmacie, April 1832.*

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ARTICLE LI.—*Acidification of Iodine by means of Nitric Acid. By A. Connell, Esq. A.M.*

The methods which have been hitherto followed for the oxidation of iodine, with a view to the formation of iodic acid, may apparently be reduced to three; 1, The action of alkaline solutions giving rise to the formation of a hydriodate and an iodate, from the latter of which the iodic acid may be separated by the original mode of M. Gay-Lussac, and more perfectly by the recent process of M. Serullas; 2, The action of euchlorine, as suggested by Sir H. Davy; and 3, The action of water on the perchloride of iodine, and subsequent separation of iodic acid by means of alcohol, as also proposed by M. Serullas. The agency of nitric acid under certain management, offers another method, which I have been unable to observe noticed any where, and which, perhaps, will be found to equal, in facility of execution, any of the preceding.

This agency may be advantageously studied on the small scale. If a little iodine be boiled with a small quantity of nitric acid in a common test tube about five inches long, the iodine is dissolved and a red solution formed. If the liquid be now farther boiled, and the orifice of the tube kept slightly stopped with a piece of cork, the iodine sublimes and condenses on the sides of the tube. The iodine is then to be washed back again into the liquid by agitation; the liquid again boiled, and the sublimed iodine again washed back into the fluid, and this process continued until iodine no longer appears, and the liquid is colourless. If the boiling be then continued for a little, so as to increase the concentration of the liquid, it usually becomes milky, and if it be poured out and evaporated to dryness, a white mass is left, which is iodic acid, retaining a little nitric acid.

Having made these observations on the small scale, I proceeded to try the process with larger quantities of the materials, with a view to its employment as a method for the preparation of iodic acid. The vessel I used was a rather large and tall flask, having a narrow orifice. In one trial I used twenty-five grains of iodine and half an ounce of fuming nitric acid; and in another I employed twice these quantities of the materials. After introducing the iodine and acid into the flask, the liquid was made to boil. As soon as any iodine sublimed and condensed on the side of the vessel, it was washed back again into the liquid by agitation. After the process had been continued for some time, a precipitation of white crystalline grains was observed to take place, and the operation of boiling and washing back the sublimed iodine was continued until the free iodine had, to a great extent, disappeared. The whole was then decanted into a shallow basin and evaporated to dryness. Any free iodine which had remained was soon dissipated by the heat. The residue of the evaporation consisted of whitish crystalline grains, which were iodic acid, retaining a little nitric acid, from which they appeared to be freed by one or two solutions in water and re-evaporations, when they

lost much of their crystalline appearance, and became a whitish delinquent mass, occasionally with a slight purplish tint, from a tendency to decomposition by the heat of evaporation.

The general properties of the matter thus obtained, sufficiently identified it with iodic acid. Exposed to a sufficient heat, it was decomposed, and iodine sublimed. Its solution in water gave a precipitate with nitrate of silver, soluble in ammonia. Saturated with potash, it gave, by evaporation, a salt composed of grouped cubical crystals, deflagrating on hot charcoal.

The quantity of the acid obtained by this process of course must vary according to the care taken to prevent the dissipation and loss of iodine. Where no particular precautions were taken to prevent its loss in the state of vapour, and where the process was not continued until the entire disappearance of iodine, the quantity of acid obtained approached that of the iodine employed. In operating with the relative proportions of iodine and acid which I have mentioned, I have no doubt that a farther addition of iodine might be made to the liquid, after the acidification of what had been first introduced; and the process might then be farther continued, as before.

I find, conformably to the observation of M. Serullas, that iodic acid does not attack gold. Its solution seems to have no action on that metal, even when aided by heat. It is equally inert in regard to platinum. Zinc is at first attacked by it with effervescence, especially when diluted; but the action ceases almost immediately, apparently from the formation of a sparingly soluble iodate, and when more zinc is added, the liquid becomes milky. No effervescence ensued when iron filings were thrown into the solution of iodic acid, whether concentrated or diluted; but when the liquid was boiled, a white powder precipitated.

A solution of the acid reddened litmus paper permanently. The permanency of the colour may possibly be owing to a trace of nitric acid still adhering, as according to Davy, the acid ultimately bleaches vegetable blues.—*Edin. New Philos. Journ.*

ARTICLE LII.—*Quantity of Extract furnished by different varieties of Sarsaparilla. By M. Thubeuf.*

[In Vol. III, p. 46, of this Journal, we gave the first paper of M. Thubeuf on this subject; the following is a continuation of his experiments on some other varieties. These additional experiments are the more interesting, from our market being supplied with large quantities of sarsaparilla from Vera Cruz and the Caraccas.]

The red or Jamaica sarsaparilla furnished me with the greatest quantity of extract; another red sarsaparilla, called sarsaparilla from the coast, which I have since met with, though differing from the preceding in its external characters, has afforded me a product similar in appearance and quantity. The Vera Cruz sarsaparilla, which is but little esteemed, if we are to judge from its scarcity, should, nevertheless, be classed next to the red varieties, from the quantity of extract it affords. This, although less bitter than that obtained from those varieties, is as much so as that from the Honduras. The Caraccas sarsaparilla, which I have also examined, gives rather more extract than the Honduras; the taste of its extract is much weaker than that of any of the others, with the exception of the Portuguese variety.

*Red Sarsaparilla from the Coast.*

Six pounds afforded,

1. Maceration in water	3xij	3vj
2. Maceration in alcohol at 22°	3iij	3vj
3. Maceration in alcohol at 22° followed by a slight digestion	3iij	
4. Maceration in alcohol at 22°		3vij
5. Maceration in water		3vij
	<hr/>	
	3xxi	3ij



*Sarsaparilla from Vera Cruz.*

Six pounds afforded,

1st operation

3xij

2d do.

3ij 3vijss

3d do.

3ij 3ij

4th do.

3vijss

5th do.

3vj

---

 3xvij 3vij
*Caraccas Sarsaparilla.*

Six pounds afforded,

1st operation

3ix 3ij

2d do.

3ij 3ij

• 3d do.

3ij

4th do.

3vj

5th do.

3i

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 3xv 3ij
*Journal de Pharm.*

## MISCELLANY.

*Manufacture of vinegar from grain.*—M. Dubrunfaut gives the following economical process for this. The grain employed in this manufacture is a mixture of one part malt with four parts rye, ground in the same manner as for brewing or distillation. In this state the corn is macerated in about six or eight times its weight of water as in the distilling process. The soaking, fermentation, &c. is all conducted as in the making of alcohol. In fact, the result of this part of the operation is to make a spirituous liquor.

When the fermentation has subsided, which takes place in a few days, the mass is strained, and the residuum is distilled; the product of this distillation is added to the clear liquid, and the whole placed in a heated room to undergo the acetous fermentation. This room contains barrels placed on tressels; these barrels are to be a half or three-fourths filled with liquid. To create an action, one fifth to one fourth of good vinegar is to be added, and some of the mother which always forms in vinegar casks.

The room should be kept at a constant temperature of 100° to 110° F. Every day the greater portion of the contents of each vessel is to be drawn off and transferred to another. To accomplish this, an empty cask is used to receive the contents of the first barrel. This operation, by agitating and airing the liquid, aids the formation of the vinegar, and should be repeated several times a day.

By the above process, the vinegar is fully developed in a month or six weeks, and if it has been well conducted, half the quantity contained in each vessel is to be drawn off into small casks, and placed in a cool room or cellar, where the clarification is to be performed; this is best effected by passing the fluid through beech shavings. The vacuum produced in each cask by this reduction, is to be filled with another portion of the alcoholised liquid, equal in volume to the vinegar that has been drawn off.—*Agricult. Manufacturier.*

*Lactic acid.*—Berzelius gives the following methods of obtaining pure lactic acid. The acid alcoholic extract obtained from milk or meat is to be dissolved in strong alcohol, and mixed with a strong alcoholic solution of tartaric acid, as long as any precipitate falls; after being left at rest for twenty-four hours in a cool place, the double tartrate separates. The solution being evaporated, the extract is to be dissolved in water, and finely powdered carbonate of lead added as long as any of it is dissolved, and till the solution acquires a sweet taste, it is then to be acted upon by

animal charcoal, and afterwards by sulphuretted hydrogen to remove the lead. The liquid is to be evaporated, to expel the sulphuretted hydrogen, and mixed with recently prepared hydrated protoxide of tin, with which it is to be left in contact for several days, occasionally stirring it. The sublactate of tin is formed, which is to be well washed, and decomposed by sulphuretted hydrogen. This will give a very pure acid. The other plan is to saturate the acid alcoholic extract with carbonate of potassa or soda, evaporate, and heat the product in a sand bath till it fuses, becomes brown, and evolves the odour of urine, and ultimately of herring or roast meat; dissolve in water, destroy the colour by means of animal charcoal, filter, evaporate to dryness, dissolve in alcohol, decompose by tartaric acid; remove the excess of tartaric acid by carbonate of lead; precipitate the lead by sulphuretted hydrogen and evaporate. This gives a less pure acid than the former.

Lactic acid is colourless, inodorous, but has a sharp taste. When evaporated at 212° F. it becomes so thick as to flow with difficulty. It attracts moisture from the atmosphere. When strongly heated, it becomes brown, slightly boils, disengages a suffocating odour like that of heated oxalic acid, blackens, swells, and finally leaves a bulky charcoal. It dissolves readily in alcohol, but less so in ether.

Many of its salts are uncrystallisable or gummy; those of potassa, ammonia, magnesia and zinc, however, are crystallisable. They are soluble in alcohol, though with difficulty, especially if there be an excess of base.—*Ann. de Chim.*

*Oxide of iodine.*—M. Sementini gives the following method of obtaining this substance. A bladder filled with oxygen is to be attached to a brass tube, the other extremity of which terminates in a fine point, and is to be luted to a glass receiver. The whole apparatus, that is, the tube and receiver, are to be heated by means of spirit lamps. The whole being thus disposed, a globular mass of iodine is to be introduced into the receiver close to the capillary opening of the tube, and a stream of oxygen directed on it, by compressing the bladder; the combination takes place, and an oily liquid of an amber colour, condenses on the sides of the receiver; this is the oxide of iodine. This may also be obtained, and in still larger quantities, by triturating together the deutoxide of barium with such an excess of iodine as will give the mixture a blackish colour. This mixture is then introduced into a long-beaked retort, which is to be heated with a spirit lamp. By this means, the oxide of iodine forms, volatilises and condenses in drops in the neck of the retort. If these constituents be employed in a perfectly dry state, the oxide of iodine will present the following properties. Oily consistence, amber colour, soluble in water and alcohol, colouring litmus paper of an emerald green, a property which we attribute to a union of the blue of the litmus with the yellow colour of the oxide; at every temperature, the combustible bodies separate the iodine. In its state of concentration, a scrap of paper is sufficient to effect this; a disengagement of oxygen takes place, whilst the paper becomes coated with iodine.—*Journ. de Chim. Med.*

*Colouring matter of lichens.*—Dr Heeren has lately instituted a course of experiments on the colouring matter of the lichens of Sweden, which are used in Holland for the manufacture of orchil and litmus (*Canora tartarea* and *Roccella tinctoria*). He has succeeded in isolating this matter which he has termed *Erythrine*. It approaches the resins in its physical and chemical characters, but is distinguished by its solubility in boiling water; this on cooling, and more especially if it contains any

free acid, permits the erythrine to precipitate in the form of a fine crystalline powder. It is colourless, inodorous, and insipid; the alkalis readily dissolve it; heated with them, and more especially with ammonia, in a close vessel, it changes into *bitter of erythrine*, but heated with these bodies exposed to the action of the air, it absorbs oxygen and passes into the state of orchil red, whilst at the same time various other substances are formed. Orchil red, when placed in contact with animal substances in a state of putrefaction, is converted into litmus, which is perfectly pure, having a deep violet colour, the blue of that of commerce arising from the presence of a small quantity of potash. In the course of his experiments, Dr H. also discovered a vegetable acid hitherto unknown to him, which he has called the *Roccellic*. The properties of this acid resemble those of the margaric and stearic. —*Bull. Sc. Phys. and Memor. Encyclop.*

*Paste for whitening the hands.*—This is one of the best compositions of the kind. It is made as follows, clean bitter almonds, 12 ounces; rice flour, 7 ounces; bean flour, 3 ounces; finely powdered orris root, 1 ounce; carbonate of potash in fine powder, 4 drachms; essence of jasmine, 3 ounces; oil of Rhodium, 2 drops; oil of Neroli, 1 drop. The almonds are to be deprived of their skin by means of hot water, then washed in cold water, pounded in a marble mortar with a wooden pestle, adding a small quantity of water, to prevent the oil from separating; when the almonds are reduced into an homogeneous paste, the rice and bean flour and orris root are to be gradually added. The whole is to be well triturated, when the carbonate of potash previously dissolved in a little rose water is to be added, and the whole well mixed, after which the essence of jasmine and the essential oils are to be gradually incorporated with the mass, and the trituration continued for some time. If the liquid above ordered is not sufficient to form a paste of good consistence, a proper quantity of rose water is to be added. This compound is to be kept in covered vessels.—*Memorial Encyclop.*

*Camphor and camphoric acid.*—M. Liebig has given the result of an examination of camphor which throws additional light on the nature of this curious substance. Taking the mean of two analyses, he found it to consist of

Hydrogen,	9.702
Oxygen,	8.535
Carbon,	81.763
———— 100.000	

According to Bouillon Lagrange, the camphorates of soda, potassa and baryta, are so little soluble in water, that one part requires from 200 to 300 parts for solution, whilst, on the contrary, Brandes states that they are deliquescent. According to Liebig, these differences depend on the camphoric acid on which the experiments were made.

When camphor is treated with concentrated nitric acid, a yellow liquid is formed; by long continued digestion, there is obtained on cooling a large quantity of white, opaque crystals, which, when boiled in water, give out a smell of camphor. These crystals are the camphoric acid of Lagrange, which gives insoluble or slightly soluble salts with all bases. They are a chemical compound of camphor and camphoric acid, and may be also formed by dissolving camphor in camphoric acid melted at a very low heat.



If this substance be treated a second time with concentrated nitric acid, more transparent crystals of camphoric acid are obtained, which afford the salts described by Brandes ; when a boiling solution of this camphoric acid was poured into one of acetate of lead, camphorate of lead was formed ; 100 parts of which gave 67.7 of sulphate of lead ; analysis, however, renders it probable that the camphoric acid still retained some camphor in combination ; it was therefore again treated with nitric acid, and the action continued until no smell of camphor was perceptible when the acid was boiled in water ; 1105 parts of camphorate of lead gave 760 of sulphate. By analysis it yielded,

Hydrogen,	6.981
Oxygen,	36.852
Carbon,	56.167
	<hr/> 100.000

*Ann. de Chim.*

*Crystallization of the alkaline metals.*—M. Bequerel has been enabled, by very simple means, to effect the crystallization of the metals of the earthy oxides, as zirconium, magnesium, glucinium, &c. The apparatus he makes use of is very simple, it consists of two tubes of about one third of an inch in diameter, open at both ends, the lower extremity of which is to be filled with moistened clay ; into one tube is to be introduced a solution of the chloride of one of these metals, and into the other an alkaline chloride. The tubes are then plunged about half their length into a vessel of pure water, and a platina wire introduced into the tube containing the solution of the metallic chloride as the salt of zirconium, for instance, and communicating with the negative wire of a galvanic pile ; the same is to be done with the other tube, except that the platina is to communicate with the positive wire. This pile should not be composed of more than six elements, and the object may be attained, though more slowly, even with a less number. In twenty-four hours the negative platina wire will be covered with a brilliant steel grey layer, consisting of pure zirconium, the crystals of which acquire some size in a few days. Certain precautions must be taken to preserve this zirconium, as in less than six hours it inflames, and is converted into zircon. It must be dried in vacuo and preserved in petroleum. Glucinium and magnesium may be obtained by the same process, but the latter is so inflammable, that it is with great difficulty prevented from decomposing. M. B., by applying the same process to the oxide of iron, obtained, after a considerable lapse of time, pure crystallized iron, which was magnetic.—*Memor. Encyclop.*

*Pectoral jelly of dog's grass (Triticum repens).*—The following preparation is spoken of in the highest terms as alleviating the irritation of the throat in coughs. Root of dog's grass, well cleaned and cut into small pieces, 3 pounds ; mallow and comfrey roots, each half a pound ; polygala and seneka, 10 ounces ; sound apples, 10 ; poppy heads, 10. Boil the whole in about a gallon of water down to one half ; remove it from the fire, express the fluid, filter and add a pound of refined sugar for each pound of the fluid ; clarify and evaporate to a proper consistence ; just before removing it from the fire, add half an ounce or an ounce of orange-flower water. This jelly is to be kept in covered vessels. Five or six spoonfuls of it taken during the twenty-four hours will oftentimes calm the most obstinate cough. It can be coloured with saffron or cochineal.—*Memor. Encyclop.*

*Red Lead.*—It is well known that there are two well marked oxides of lead, the protoxide, yellow oxide or massicot, and the peroxide or brown oxide. Red lead is a third oxide intermediate between the preceding; its nature, which had apparently been well established by the experiments of Berzelius, has lately given rise to controversy. The following are the results of the experiments of Dumas on the subject. The common red-lead is always a mixture of the protoxide and real minium. The following shows the quantity of oxygen given out by different miniums on calcination.

100 parts subjected to 1 heat afforded	1.17
do. 2	1.22
do. 3	1.36
do. 4	1.50
do. 5	1.55
do. 8	1.75
do. of orange mineral	2.23
do. purified minium	2.33

Hence it appears, that however long the calcination of the yellow oxide be continued, this substance can never absorb as much oxygen as does the finely divided oxide, which results from the decomposition of white lead, and is used in the formation of orange mineral. M. Dumas also thinks that, chemically, pure minium can be obtained, 1st, by heating orange mineral for a long time in contact with oxygen gas; 2d, by removing the protoxide, mixed with common red lead, by means of the neutral acetate of lead; 3d, by using in like manner a solution of potassa. These three methods furnish an analogous result; and the oxide may be considered as composed of

Protoxide of lead,	2 atoms
Peroxide of lead,	1 atom.

*Memor. Encyclop.*

*Cinchona.*—M. Payen communicated some observations of M. Cochet on Peruvian barks. The trees which afford this bark do not flourish well, except in elevated situations, and on the sides of sheltered ravines. Their culture requires a sort of hot-bed formed of leaves, and of two or three feet in thickness. These trees are of very slow growth, and those from which the bark is stripped are of a great age. The bark is procured during the rainy season (October to April). At this time the trees are covered with beautiful white flowers, by which they are easily recognized. They are cut down and the bark taken from the trunks only. The wood contains a very sweet juice, which serves for drink for the labourers employed. The wood is very hard, and might be useful in the arts, were it possible to transport it from the almost inaccessible spots in which the trees grow.—*Bull. Soc. Philom.*

*New acid in the cherry laurel.*—M. Peretti has discovered that the essential oil of cherry laurel contains, besides hydrocyanic acid, another acid which is crystallizable and appears different from any hitherto discovered in vegetables. Crystals were formed in this oil, which M. Peretti at first thought were camphor, but having distilled a large quantity of the leaves to obtain laurel water and the essential oil, he found many brilliant crystals in the form of acute prisms; after having

been dried on blotting paper, they were dissolved in alcohol, and water added to the solution, which caused the separation of a great quantity of white and acid flakes, susceptible of dissolving in ammonia. These crystals had an acid taste, and a faint smell of bitter almonds.—*Giorn. Arcad. and Memor. Encyclop.*

*Hydro-chloride of carbon (chloric ether).*—According to M. Morin of Geneva, this compound consists of

Carbon,	38.4	nearly equivalent to 4 atoms.
Hydrogen,	4.8	3
Chlorine	56.8	1

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100.00

M. Dumas remarks, that these results differ materially from those of other chemists. MM. Robiquet and Colon, first proved that it consisted entirely of carbon, hydrogen and chlorine, and shortly afterwards, M. Gay Lussac determined its specific gravity, which he found to be perfectly analogous to the sum of the densities of chlorine and bi-carburetted hydrogen; and therefore concluded it to be a compound of equal volumes of those gasses. This was confirmed by the analysis of M. Despretz, and M. Dumas finds this to be its true composition, or

Carbon,	24.6	nearly equal to 2 atoms.
Hydrogen	4.1	2
Chlorine	71.3	1

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100.00

*Ann. de Chim. et de Phys.*

*Purification of mucilaginous solutions.*—M. Guerin gives the following method for purifying mucilaginous solutions. The gum is to be dissolved in rain water, and a current of chlorine passed through the solution, until any brown colour it may have is destroyed. After this is accomplished; the fluid is treated to drive off the chlorine in solution, when a perfectly colourless mucilage will be obtained, which does not contain the smallest quantity of chlorine capable of being injurious in any process in the arts, in which mucilages are employed.—*Memor. Encyclop.*

*Tooth-brushes.*—One of the best tooth-brushes for persons with tender gums is what is known in France by the name of *brosse de corail*. This is nothing more than the root of the lucerne grass (*Medicago sativa, L.*). These roots are carefully dried, deprived of their bark, and exposed to a gentle heat. When perfectly dry they are cut into pieces of about three inches in length, and one of the ends beaten gently with a hammer; this separates the fibres and forms a kind of brush of them. They are then placed for a day or two in alcohol coloured with alcanet. When taken out they are again dried and polished with an ivory burnisher.—*Journ. de Conn. Usuel.*

*Preservation of iron from rust.*—M. Zeni has invented a varnish for this purpose, which has proved fully competent to effect this result. Eighty parts of pounded brick are to be passed through a fine sieve and mixed with twenty parts of litharge; the whole is then rubbed up with a muller with linseed oil, to the consistence of a

thick paint, which may be diluted with spirits of turpentine where applied. Before the iron is coated with this preparation, it should be well cleaned. From an experience of two years, upon iron exposed to the air, and watered daily with salt water, after having been covered with two coats of this varnish, it was thoroughly proved that it answered the desired end.—*Bull. d' Encouragement.*

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*Liniment for chilblains.*—R. Chicken fat purified, or axunge, } aa oz. xij.  
 Oil of sweet almonds, }  
 Yellow wax, oz. iv.

Melt together by a gentle heat, pour into a heated mortar, and when nearly cold add

Oil of lavender, oz. iij.  
 Aqua ammonia, f oz. j.  
 Camphor, oz. j.  
 dissolved in  
 Tinc. Sinap. Nig oz. ij.

The volatile oil is to be mixed with the ammonia, the tincture added to this mixture, and the whole then poured on the fatty mass in the mortar and well triturated. This liniment it is said will cure the worst chilblains if they have not ulcerated. It is to be rubbed on the inflamed part before a brisk fire.—*Journ. de Chim. Med.*

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*Wax from the buds of the poplar.*—An extensive land owner in Flanders is said to have succeeded in obtaining a quantity of wax, by putting the buds of the poplar tree into bags, and submitting them to pressure. The wax is of good quality and has an agreeable perfume.—*Repert. Pat. Invent.*

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*Preservation of milk.*—M. Dirchoff gives the following plan for keeping milk for an indefinite space of time. New milk is to be slowly evaporated over a gentle fire, until it is reduced to a dry powder. This powder is then put into a bottle hermetically sealed. When the milk is wanted for use, it is only requisite to dissolve a portion in water, and the solution will have all the qualities as well as taste of milk.—*Ibid.*

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*Box-wood a substitute for hops.*—M. Du Petit Thouars, lately stated to the Philomathic Society of Paris, that more box-wood than hops was employed in making almost all the beer brewed in Paris. Box-wood contains a powerful soporific principle, with a bitter taste, which has received the name of buxinia.—*Repert. Pat. Invent.*

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*Defence against flies.*—Oil of laurel has for a long time been employed with perfect success by the butchers of Geneva, to prevent flies from approaching their meat. This substance has also been used to guard the gilt frames of mirrors and pictures against the dirt caused by these insects.—*Recueil Industriel.*

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*Compound of alcohol and chlorine.*—M. Liebig states, that if chlorine be passed through absolute alcohol, the latter is wholly converted into a white crystalline mass. This substance is a hydrate of a new combination formed of chlorine, carbon



and oxygen, and is termed *choral* by M. Liebig. When it is deprived of water, it assumes the form of a liquid heavier than that fluid and unites with it, and after some time changes into a white powder, which is insoluble in water. The anhydrous alkalies do not decompose it, but with the addition of water it is converted into formic acid and a new chloride of carbon, analogous to that produced by distilling alcohol over chloride of lime. By the action of chlorine on ether and pyroacetic spirit, compounds analogous to choral are formed.—*Ann. de Chim.*

*Preservation against rust, &c.*—A piece of linen or cotton cloth, steeped in a saturated solution of lime or sulphate of soda, and carefully dried, preserves from humidity and oxidation, delicate steel instruments, as well as parchment and paper. Steel instruments may likewise be preserved in quicklime. A magnetic needle suspended by a silk thread in lime-water, undergoes no deterioration.—*Journ. de Connoiss Usuell and Silliman's Journ.*

*Cement for glass, porcelain, &c.*—Take half a pound of the curd of skimmed milk, wash it until the water comes away limpid, press out all the water, mix the curd with the whites of six eggs, and when well incorporated, add the expressed juice of fifteen cloves of garlic, triturate the whole thoroughly in a mortar, then add gradually a sufficient quantity of dry and sifted quicklime to form a dry paste, and continue the trituration. To use this mastic, rub a small portion of it with a little water, on a piece of glass with a muller; when of a proper consistence, apply it to the fragment to be mended, or the crack to be filled; bind the parts together and let it dry in the shade. This will resist fire and boiling water. This mixture pulverised and mixed with an equal quantity of quicklime, may be kept for a long time in a well stoppered phial.—*Idem.*

*Indelible ink.*—Nitrate of silver, 1 drachm; printer's ink, 1 ounce; triturate together in a glass mortar. A small portion, put by means of a ball on types, and thus stamped on linen or muslin, will give a very permanent impression.—*Ibid.*

*New principle in cinchona.*—M. Vau Mons has discovered a new principle in the bark of the *Cinchona montana*, which is white, crystallisable and extremely bitter. The discoverer calls it *montanine*, and says that he has cured intermittent fevers in three days with it, in doses of two grains a day.—*Am. Journ. Med. Sciences.*

*Naphthaline.*—M. Laurent has obtained this substance from coal tar, by the following process. The coal tar is to be distilled, and a current of chlorine passed through the product for three or four days, thus producing hydrochloric acid, which acts on the oily matters and renders them more fluid; after being redistilled, the naphthaline precipitates at a temperature of 8° or 10° below zero; the fluid oil is to be expressed, and the naphthaline purified by cold alcohol. By dissolving it in boiling alcohol, it may be obtained still whiter and purer, and if it be afterwards sublimed, it assumes the form of brilliant white pearly laminæ. It will preserve potassium unaltered. It acts on various bodies like alcohol, and burns with a luminous white flame. *Journ. de Chim. Med.*

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